MARCH 13, 1947

American Machinist

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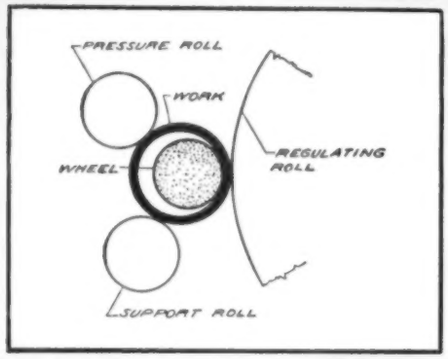
In this issue

Control Practices—A roundup report
Thread Forming on Thin Shells
Variable-Speed Punch Press

. . . when it comes to low-cost CENTERLESS internal grinding



This sketch illustrates the chuck-less method of Heald Centerless grinding, in which three rolls locate and rotate the work on its own outside diameter. Ground bore is actually generated from the O.D. Result: simplified grinding, perfect concentricity, lower costs.

EACH ONE of the four different Heald Centerless Internals is designed to grind a particular range of work. All together, they cover every centerless internal grinding requirement—handling work all the way up to 26" O.D. by 16" long.

You'll find that the unique Heald method of Centerless grinding can cut your costs and improve quality in a number of ways. For instance, it assures perfect concentricity between ground bore and O.D. . . . gives fast, easy loading, completely automatic on the No. 81 . . . provides automatic sizing controls when required . . . permits accurate relocation of work for checking or reversal . . . eliminates work holding fixtures . . . and often allows one operator to handle several machines.

For further information on Heald Centerless grinding, and how one of these machines can be applied in your own work, get in touch with the Heald branch office nearest you. Or write: THE HEALD MACHINE COMPANY, Worcester 6, Mass.

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American Machinist

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CONTENTS for March 13, 1947

VOL. 91, NO. 6

ADMINISTRATION

Editorial.....*Burnham Finney* 99
Good Plantkeeping at Vulcan Tool Co..... 105
Our Shop.....*O. Fluharty* 107
Can You Aid the Lemon?.....*Round Table* 137
C-O-L Bonus Aids Employee Relations.....*Harold J. Ashe* 140

MATERIAL CUTTING, FORMING

Thread Forming in Thin Metal.....*Wallace C. Mills* 101
Sharpening Carbide Face Mills.....*G. W. Sharp* 108
Coax, Don't Hammer, Dieheads..... 111
Variable-speed Press Jumps Output.....*Joseph I. Karash* 112
Prime Steel Scrap Salvaged for Auto Parts..... 140
How to Remove a Heavy Lathe Chuck.....*Arthur E. Lynch* 145
Use the Bandsaw and Save Material.....*H. J. Chamberland* 147

SPECIAL REPORT

Control Practices
- Production Control Spots Shortages.....*Ward A. Ring* 117
- Card & Chart System Controls Inventory.....*William F. Lent* 121
- Production Methods Aid Carbide Control.....*H. Flynn* 125
- Scheduling Preventive Maintenance.....*R. H. Heberling* 129
- Quality Control Aids Supervisors—3.....*David T. Armstrong* 133

TOOLING

Air Fixtures Speed Hollow Milling.....*Kenneth F. Brooks* 106
Short Cuts.....*A. H. Waychoff* 138
Cylindrical Pins Make Good T-Heads.....*Donald A. Baker* 142
Flytool Milling Cutter Removes Sand or Scale.....*A. B. Miller* 142
Circular Guide Races Lapped Uniformly.....*Floyd W. Miller* 143
Hints on Small Tools.....*Earl Goddard* 144
More Tool Shots..... 145
Graded Block Sets Aid Clamping Buildups.....*S. Framurz* 146
Faceplate Mounted Unit Grinds Inside Castings.....*U. Wheatley* 146
Connecting Rod Controls Large-radii Turning.....*Dalton White* 147
Tension Chuck Improves Coil-winder Rigidity....*John J. Koster* 148
Rosan Insert Permits 360° Elbow Positioning.....*Lester Wolston* 148

ENGINEERING

How About Standardizing Our Standards?.....*Donald A. Baker* 111
Shall We Cling to the Inch?.....*Fred H. Colvin* 139
Adjustable Autotransformer and Knee Switches...*Don Campbell* 141
Mechanical Tubing.....*3 Reference Book Sheets*

NEWS OF METALWORKING

Spot News 97
Report from Germany..... 148A
Gaging Business 150
Detroit News 153
Washington News 155
Names in the News..... 159

DEPARTMENTS

Tips for Top Shop Men..... 107
Talking Shop 116
Reference Book Sheets..... 163
Shop Equipment News..... 169
Parts and Materials..... 182
Letters to the Editor..... 186
Round Table Discussions... 190
Quotes 200

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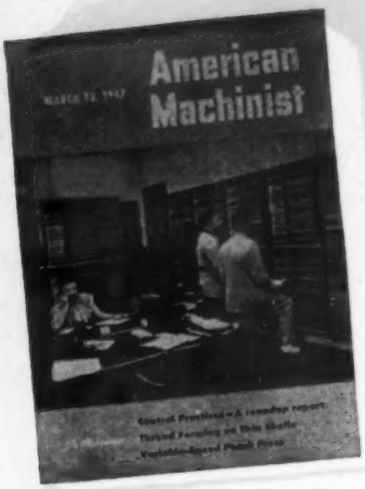

Chips and QUIPS

Production Control . . . Fred Crawford checks data with a foreman in the production control room at Woodward Governor Company, and Martha Stroberg looks pleasant (very) as Hans Zielke's camera clicks for our cover Kodachrome. This room is in a glassed-in balcony overlooking the shop, readily visible from any point, and in communication by phone with every foreman's desk. There's even a balcony light that flashes when the line is busy, so other foremen don't get a busy signal. The desks of Ward A. Ring, production manager (author of the this-issue article on production control), and his assistant flank the camera position in this photo.

Roundup . . . Modern control practices have penetrated every corner of the metalworking plant. To give the broad picture, we've assembled a group of case studies. There's production control at Woodward Governor, inventory control at Cutler-Hammer (by Wm. F. Lent, production manager), carbide-tool control at Jack & Heintz, and maintenance control at Edward Valve (by R. M. Heberling). To round out the roundup, it's followed directly by part 3 of David Armstrong's series on quality control.

Face Make-up . . . G. W. Sharp of Kennametal, has set down for you the simple methods for reconditioning face mills, beginning on page 108. It's simple . . . when you know how . . . The same comment goes for application of transfer ideas to punch presses. AC Sparkplug has been doing it successfully, Rupert LeGrand reports.

Unfree with Air . . . "Free as air" is just a phrase, at least as far as clamping is concerned. Kenneth F. Brooks, master mechanic at 1900 Corporation, describes the use of air fixtures there for hollow milling.

Decimals . . . Before, and just after, the turn of the century, there was furious debate about the metric system of linear measurement in our pages. Proponents of English measure finally squelched the "furrin" influence—they thought. World War I put a crack or two in their arguments, World War II and the promised era of machine-tool exports pose serious questions about our ability to stuff a tough system of measurement down metric-trained world throats. Fred Colvin reopens the old argument by changing his mind.

Why Variable? . . . J. Karash of Reliance Electric has been getting noteworthy results with variable-speed punch presses. We've asked him to tell you how, why and when. His answers and arguments are presented beginning on page 112.

Competition . . . The editors are vying for assignments on special reports these days. They turn out to be as sensitive to fan letters as Hollywood stars, and special reports have been drawing a flood of requests for reprints, plus some very pretty compliments. As copies of last year's 25 special reports crossed the million mark, the editors are positively purring. Some of the reports are still available as reprints at a dime or 15 cents a copy, with reductions for quantities. We even have a mimeographed list of available subjects.

Coming . . . We anticipate the May get-together of plastics-minded engineers in *A.M.* for March 27 with a cover showing plastics machining and a special report on design and use of cast stainless-steel molds for plastics. They call 'em "stainless cavities," but we argue that a cavity must be air-filled . . . We'll also tell how to draw a triple-thick bottom in aluminum, how hard-faced rolls fabricate steel containers, and give pointers on broaching and dust control . . . Best of all, we've captured the elusive Kilroy, who'll tell about automatic handling for plating at Daystrom Corp.

THIN METAL MAN . . . **Wallace C. Mills, chief tool engineer since 1921 of the J. L. Clark Mfg. Co., Rockford, Ill., makes a hobby of writing about light-metal stamping, based on his daytime job. Clark contract-jobs lithographed metal boxes, cans, spools, caps, trays, and flashlight cases, so Mr. Mills knows whereof he speaks in his current lead article.**

Born at Janesville, Wis., April 16, 1889, Mr. Mills was graduated in mechanical engineering from Stanford in 1911. He was previously a tool and machine designer for Barber Colman and General Motors. He has written for *Product Engineering* and other magazines, as well as two earlier articles for *A.M.*, both on die designs for thin metal. . . . And more are coming.

Tech.

You're on the Right Track
Towards Making Better Bevel Gears

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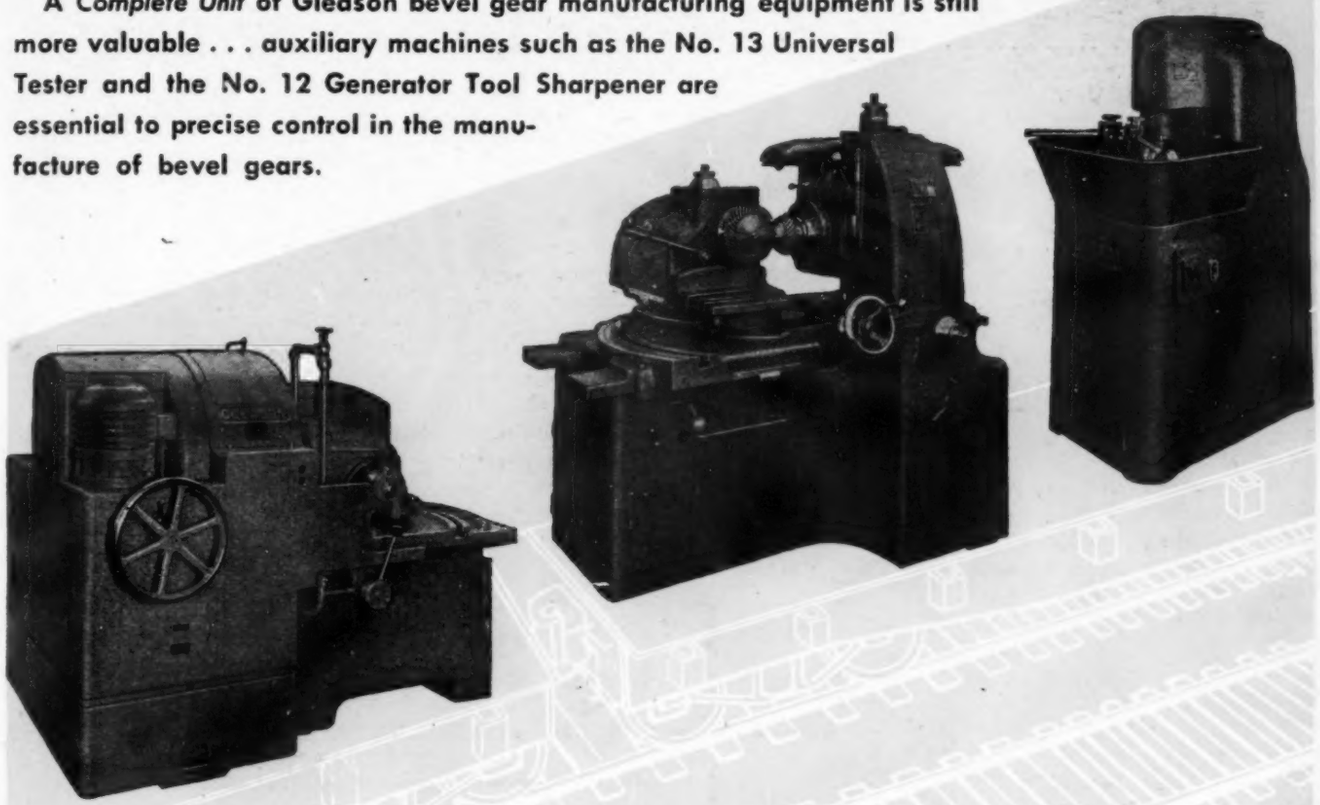
A Gleason 12" B Straight Bevel Generator is a valuable addition to any plant where straight bevel gears are required . . . with localized tooth bearing for coniflex gears, faster cutting speeds because of stronger machine construction and more convenient set-up and operation.

A *Complete Unit* of Gleason bevel gear manufacturing equipment is still more valuable . . . auxiliary machines such as the No. 13 Universal Tester and the No. 12 Generator Tool Sharpener are essential to precise control in the manufacture of bevel gears.



The Gleason No. 13 Universal Tester duplicates the actual operating conditions of the gears in their final mountings, assuring gears that are right before final assembly. Testing *before production*—to establish correct set-up of the gear cutting machine—*during production* to maintain uniform quality of the cut gears, and *after production* to determine the best running position of the gears in assembly.

Modern bevel gear applications require smooth surface finish and accuracy. The Gleason No. 12 Generator Tool Sharpener will accurately sharpen all tools used on Gleason straight bevel generators and at the same time provide a superior cutting edge and longer tool life.

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AUTOMATIC PROFILE MILLING

BRONZE DRIVING BOX LINERS

cuts costs . . .

saves time . . .

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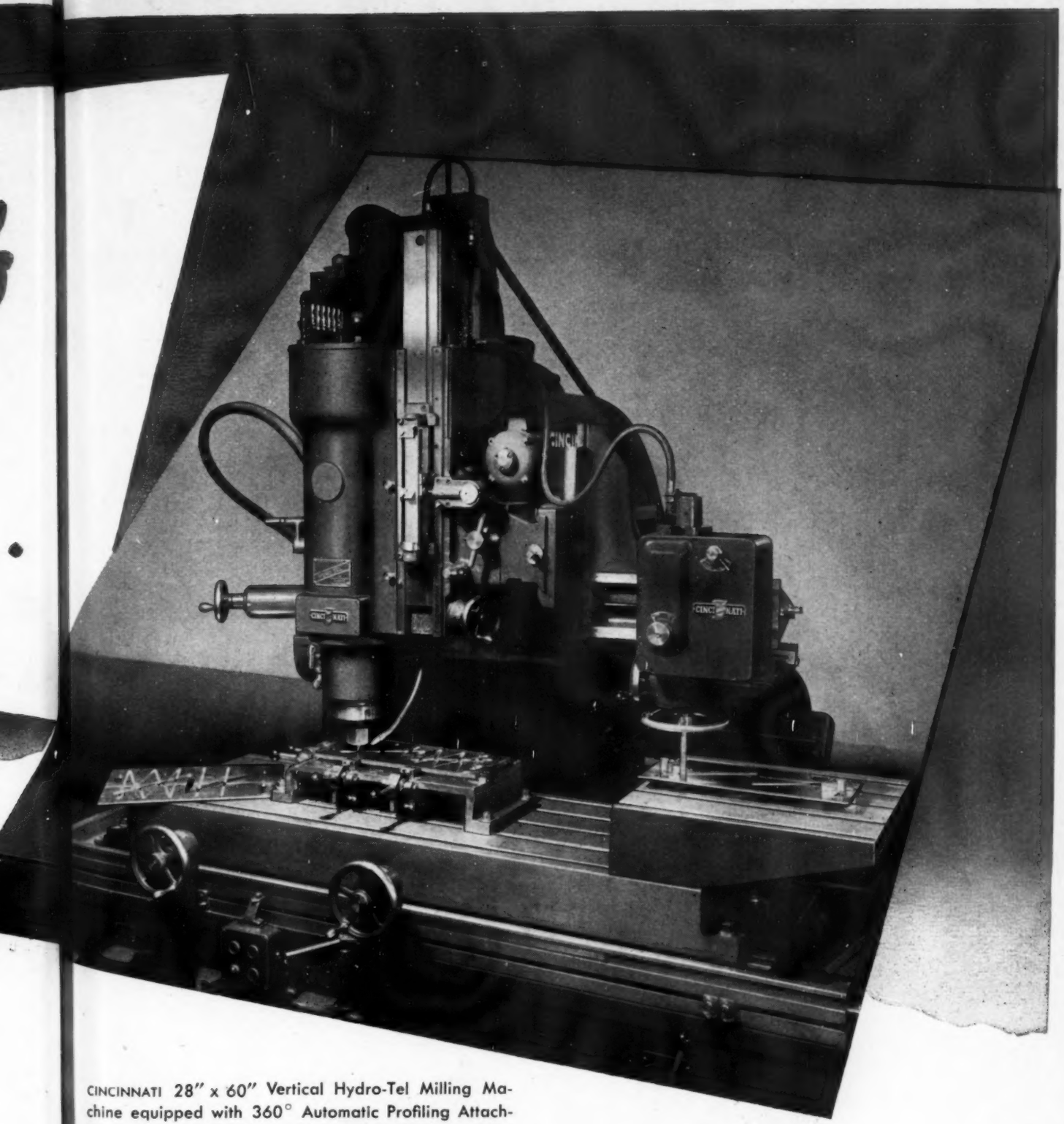
MILLING MACHINES •



CINCINNATI 28" x 60" Vertical Hydro-Tel Milling Machine equipped with 360° Automatic Profiling Attachment. ¶ The 28" series CINCINNATI Vertical Hydro-Tel Milling Machines are available in three table travels, 60", 96" and 120". Complete details may be obtained by writing for catalog M-1284-1.

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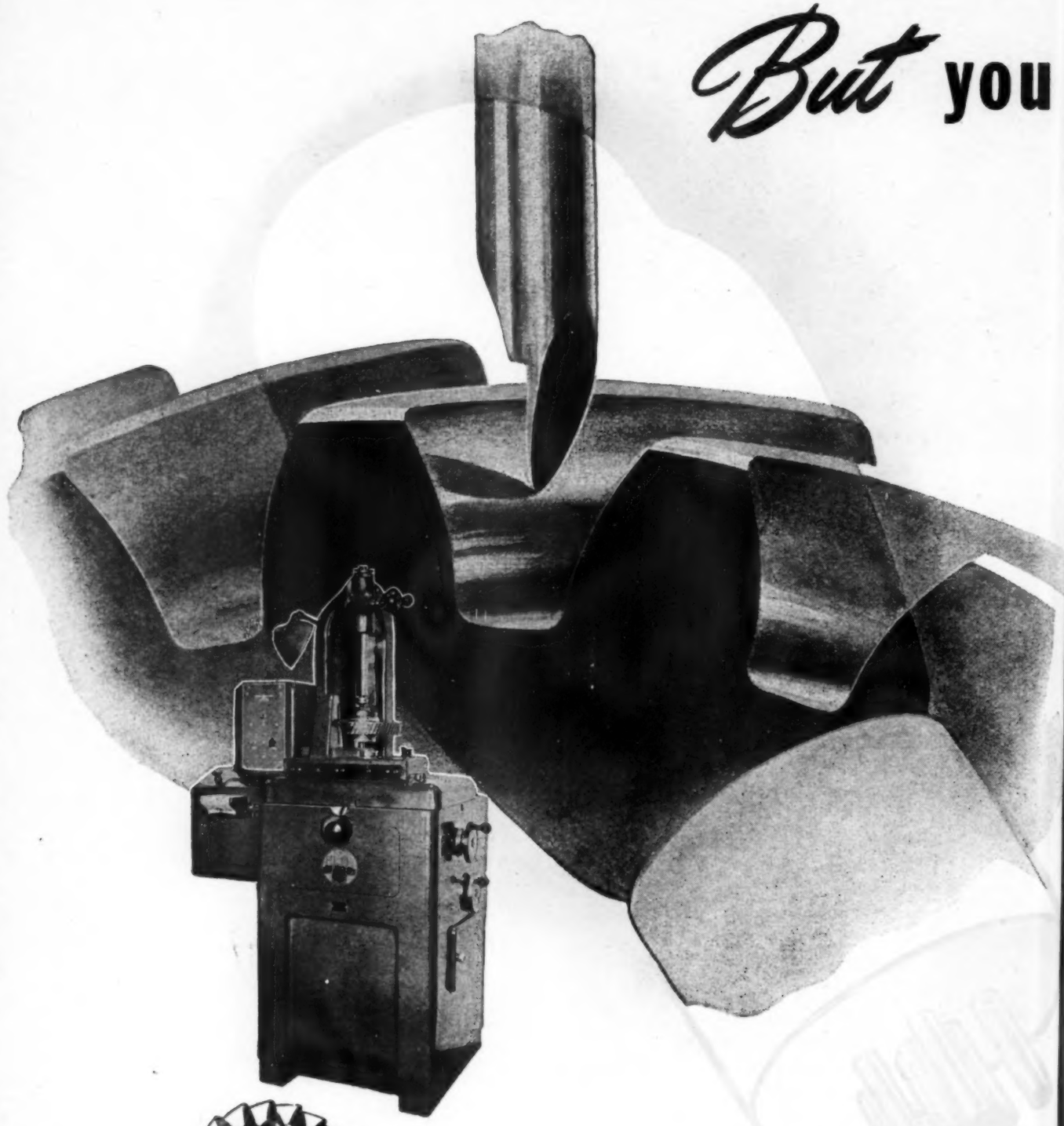
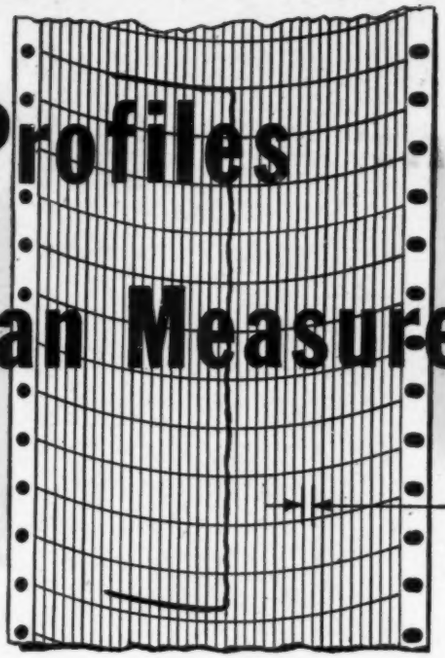


THE FELLOWS METHOD... MACHINES AND TOOLS FOR



Profiles can Measure them to .0002"

You can quickly check gear elements to close accuracy with Fellows inspecting and recording instruments.

Making gears accurately and economically—by advanced techniques of cutting and shaving—*is one important* phase of "The Fellows Method". *Measuring* gears is another.

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With the Fellows Involute Measuring Instrument, your inspector can observe minute errors of one ten-thousandth of an inch on a dial indicator. The readings can also be permanently recorded on synchronized ruled paper charts, where deviations of an electrically-operated pen serve to locate and measure errors in profile.

Other proved, advantageous instruments and techniques for checking the accuracy of gears and related parts are available from Fellows.

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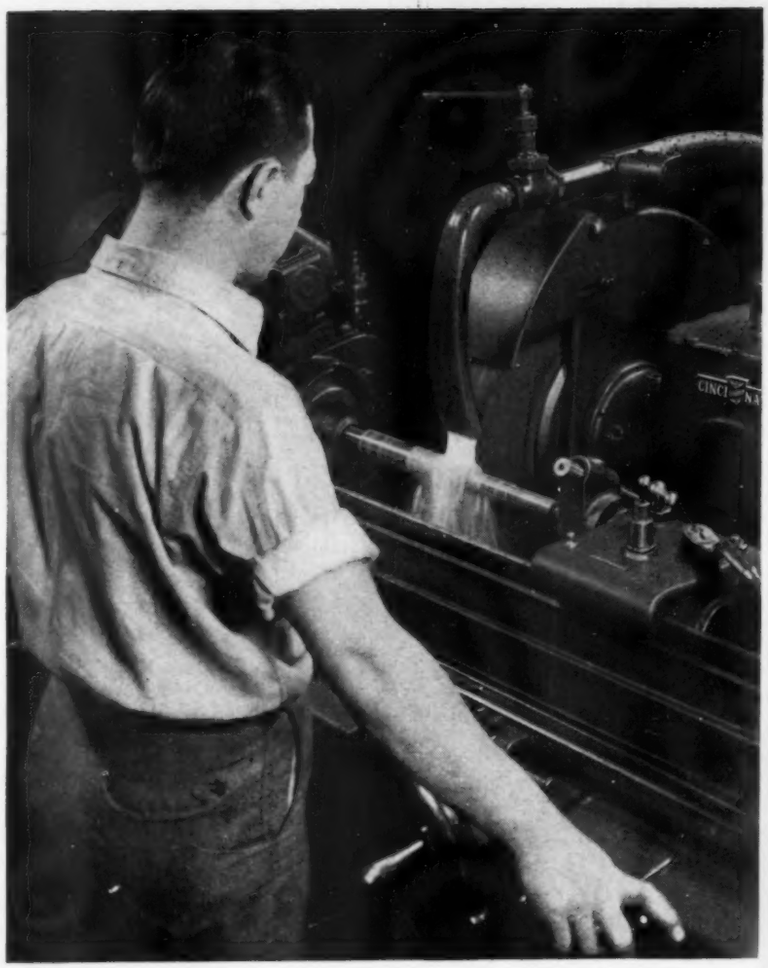
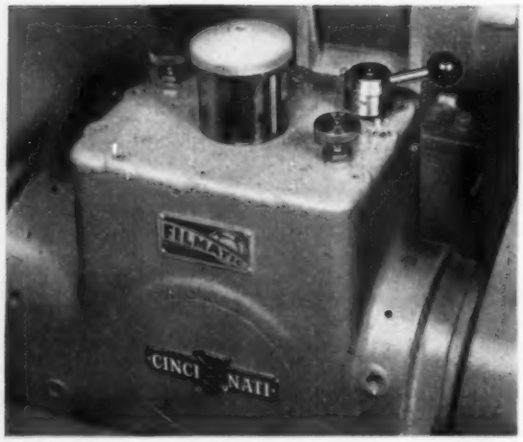
ALL OPERATIONS FROM BLANK TO FINISHED GEAR

YOU CAN GET *Increased Productivity* WITH THESE EXTRA EQUIPMENT ITEMS

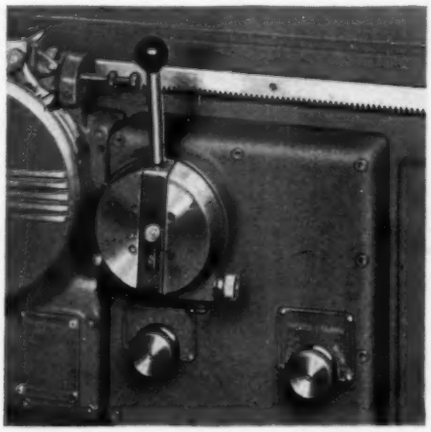


A typical infeed job. Grinding a rotor shaft on a CINCINNATI FILMATIC 6" Plain Hydraulic Grinding Machine. The operator has his right hand on the infeed lever.



Spindle Reciprocating Attachment. Reciprocation of grinding wheel spindle is automatic, with standard stroke from 1/32" to 3/16". This is an unusually desirable feature for infeed grinding operations.

Right: Automatic Infeed Attachment — hydraulically operated. Complete cycle is automatic . . . rapid advance wheel to work, grind, tarry and return.



CINCINNATI

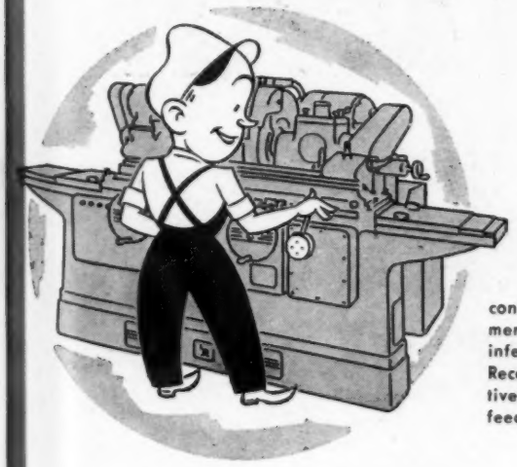
CINCINNATI GRINDERS

CENTER TYPE GRINDING MACHINES

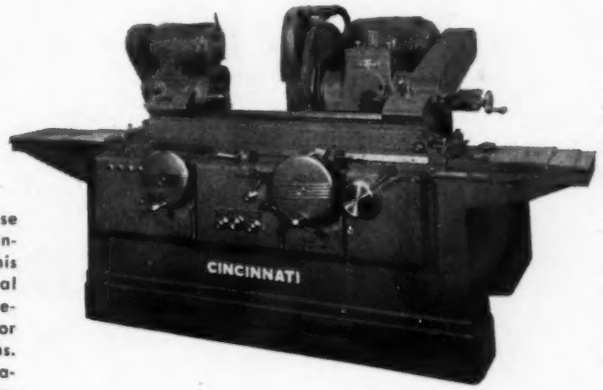
● Equip a CINCINNATI FILMATIC Plain Hydraulic Grinder with a grinding wheel spindle Reciprocating Attachment and a Hand Servo Infeed Attachment, or an Automatic Infeed Attachment, and you not only increase productivity of the machine, but raise finish and sizing standards to an extra high quality. ¶ The *spindle Reciprocating Attachment* automatically reciprocates the grinding wheel, eliminating wheel marks and raising quality of finish. It may be adjusted for a stroke of 1/32" to 3/16", and for fast or slow reciprocation. The *Hand Servo Infeed Attachment* rapidly advances the wheel to the work, and further movement of the lever advances the wheel at a grinding rate. After spark-out, the lever is returned and the wheelhead rapidly retracts one inch (more if desired), which allows plenty of space to safely load and unload the work. This is for small to average quantities of parts. The *Automatic Infeed Attachment* is more desirable for grinding large quantities. The operator merely starts the lever on its downward arc, then it automatically takes over to rapid advance, grind, tarry and return. It has a "run ahead" feature, too, for varying stock allowances. ¶ These features, available at slight extra cost, add production infeed to the traverse grinding operations which you may assign to your CINCINNATI FILMATIC Plain Hydraulics. Catalog No. G-537 contains engineering specifications on the 6" and 10"-L machines; Catalog No. G-533 for the 14"-L grinder, and G-490-1 for the 10" machine. Write for copies today!

Left: Hand Servo Infeed Attachment—hydraulically operated. For manual control of plunge cut (infeed) grinding. Includes rapid advance of wheel to work, and automatic starting and stopping of coolant flow and work rotation. Total wheelhead movement equals 1", about .990" of which is rapid traverse.

Right: With the Automatic Infeed Attachment, the operator simply moves the lever a slight amount, then the entire cycle proceeds automatically. While grinding continues, operator may prepare next work piece. This feature is especially desirable for infeed grinding of large quantities.



Left: Illustrating the use of the Hand Servo Infeed Attachment. This device offers manual control of hydraulic movement of the wheelhead for infeed grinding operations. Recommended for comparatively small quantities of infeed work.



CINCINNATI FILMATIC No. 10"-L Plain Hydraulic Grinding Machine.

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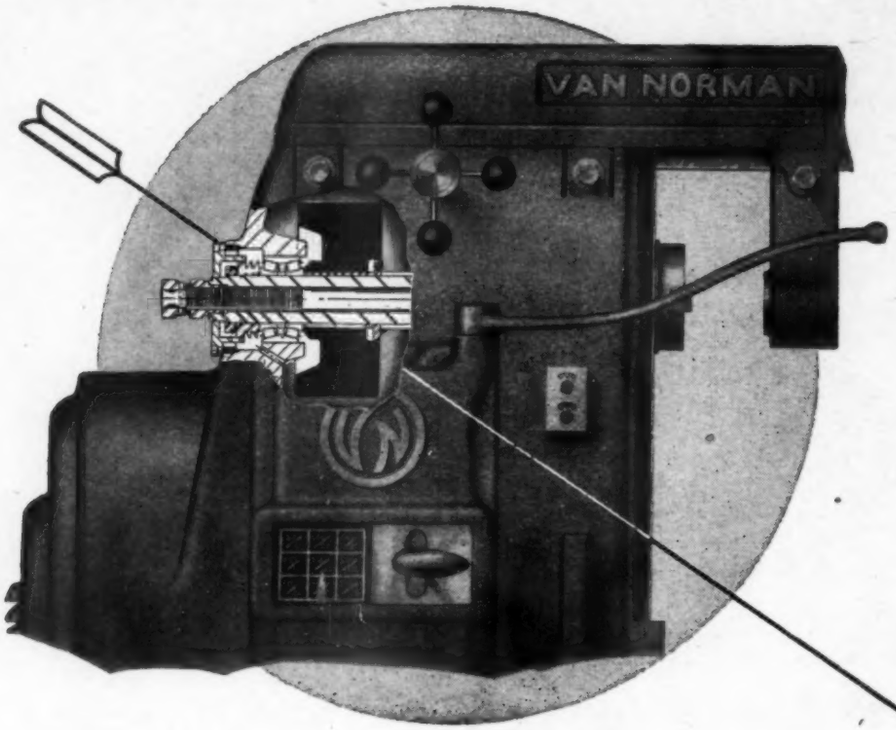


Built-in Flywheel

INCREASES CUTABILITY OF NEW

VAN NORMAN

No. 2 Medium

HORIZONTAL MILLER

Table: 50"x10"— Motor: 5 HP

Among the outstanding design features of the *new* Van Norman No. 2 Medium is the heavy *built-in* spindle flywheel . . . an exclusive Van Norman advantage. Mounted on the spindle inside the column, it provides smooth transmission of power to the cutter. It improves cutability and assures a smooth finish on the work. In addition, the flywheel increases the work range of the miller by enabling operators to handle a larger variety of work.

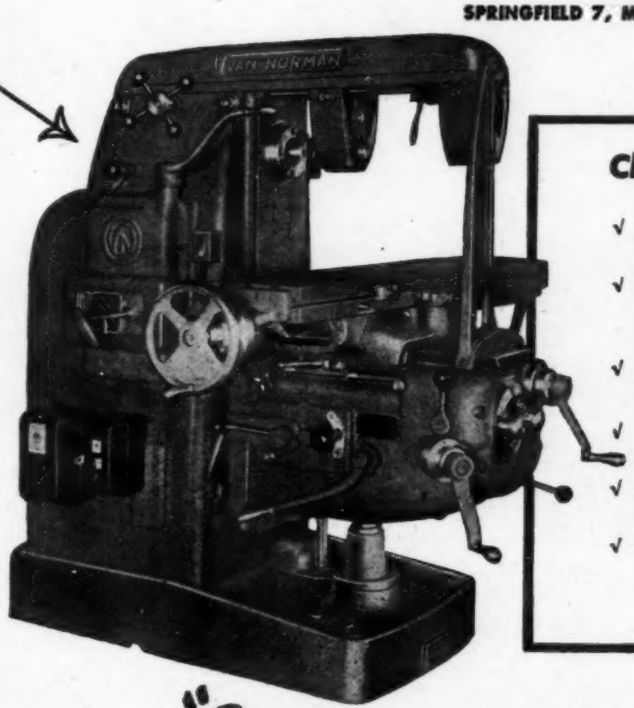
The No. 2 medium has front and rear directional control of all power feeds, as well as six-way rapid traverse. This permits operators to operate the machine from either position. It assures maximum safety and increases operator output by minimizing fatigue.

The exclusive Van Norman single lever speed selector provides quick selection of 18 spindle speeds. The rotary-type feed selector and high-low series feed selector permits easy selection of 12 feeds. Other new and improved construction and operating advantages include heavy column and base, large hardened alloy steel gears, hardened multi-splined shafts, taper roller bearings and automatic lubrication.

The new Van Norman No. 2 medium is available with plain or universal saddle. Write for complete information today.

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

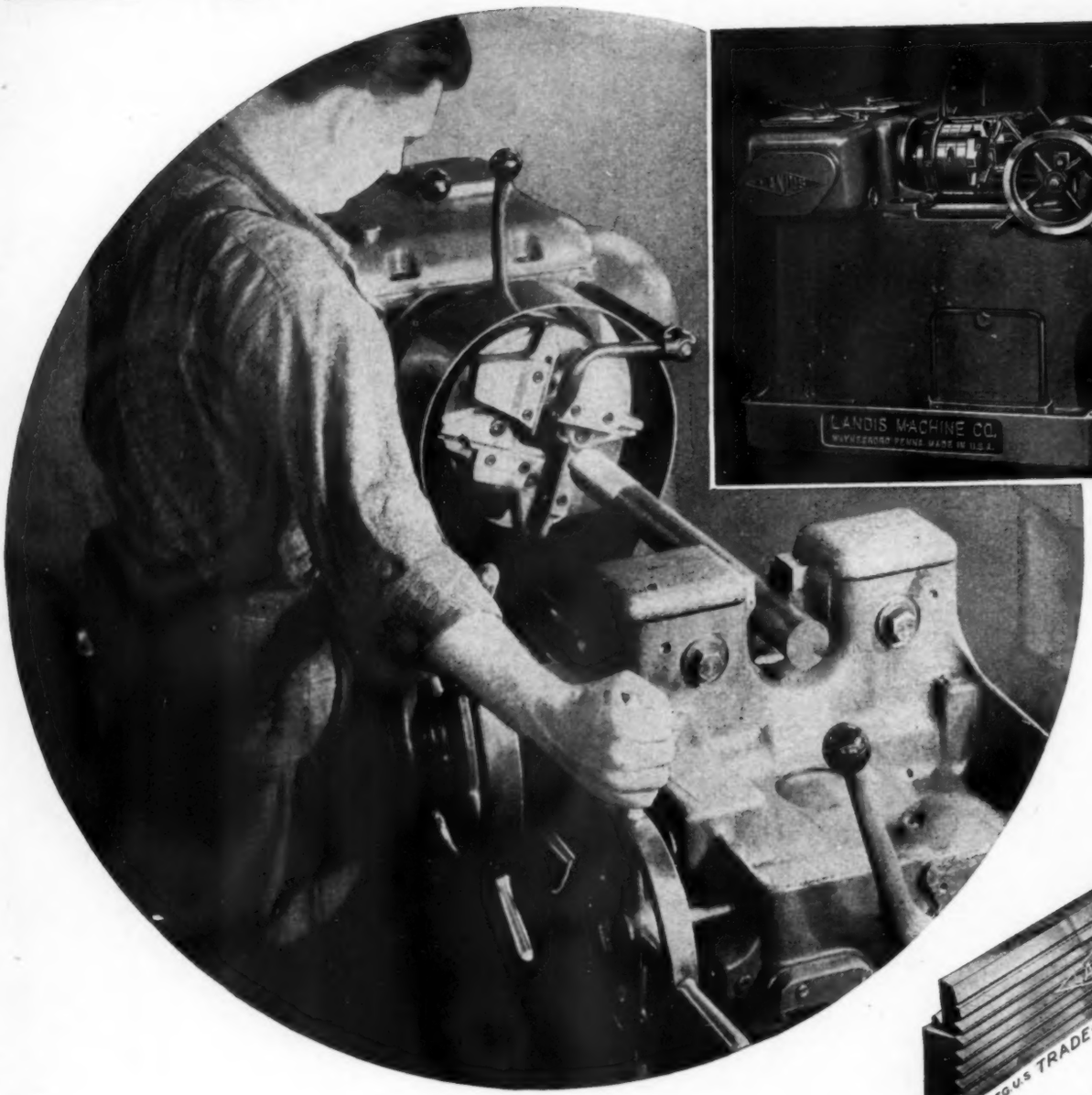


Check These Plus Advantages

- √ Built-in spindle flywheel
- √ Front and rear directional power controls
- √ New heavy column and base
- √ Single lever speed selector
- √ Large diameter cutter spindle
- √ Overarm pilot wheel
- √ Large easy-to-read dials
- √ Heavy ram-type overarm
- √ Automatic lubrication
- √ Hardened alloy steel gears with large tooth area
- √ Six-way rapid traverse

"It pays to Van Normanize"

16 Vital Reasons LANDMACO



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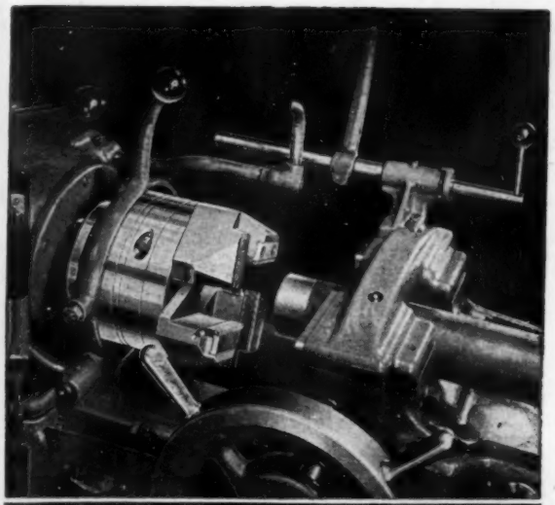
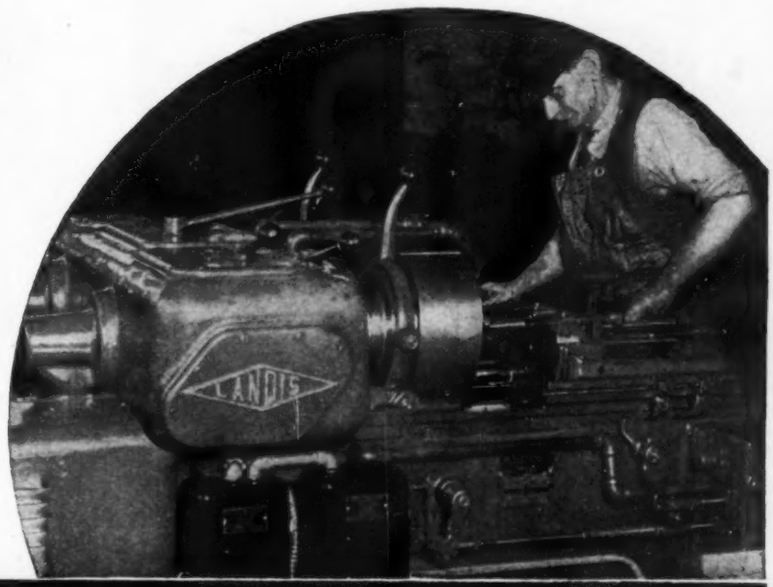
for the Superiority of THREADING MACHINES



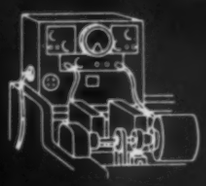
The many new and exclusive features of LANDMACO Threading machines combine to assure the greatest possible degree of accuracy, ease of operation and flexibility in making set-up changes.

- Single Pulley Drive.
- Self-contained selective type gear box provides eight spindle speeds.
- Flood lubrication for all gears and bearings.
- Gear type pump driven and automatically reversible.
- Built-in pump can be removed without disconnecting any piping.
- Motor-in-base affords compact and efficient motor drive.
- Friction clutch control.
- Head opens and closes automatically.
- Hand lever for opening and closing head.
- Semi-steel bed of box type reinforced by inner walls.
- Minimum die head overhang.
- Adjustable vise easily lined up with spindle.
- Oil reservoir lubricates guides through felt pads in carriage base.
- Gibbed carriage compensates for wear.
- The heavy rim of vise hand-wheel, giving fly-wheel effect, facilitates gripping of work.
- Guards completely cover and protect guides.



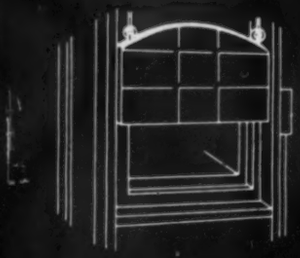
MACHINE CO. WAYNESBORO PENNA. U.S.A.

6 Good Reasons Why LANDIS TOOL



1

Freedom From Vibration—Unbalanced or improperly balanced rotating parts can cause vibration and marred finish. All Landis Tool rotating parts are balanced on a machine which tells the amount and location of any unbalance. Perfect static and dynamic balance is assured because the correction is properly made and vibration eliminated.

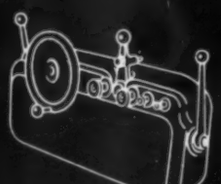


2

Heat Seasoned Castings—Annealing of cast parts in a furnace with slow cooling seasons all Landis Tool castings. This eliminates any casting strains that could cause dimensional change during the usual slow aging of castings after a machine was placed in service.

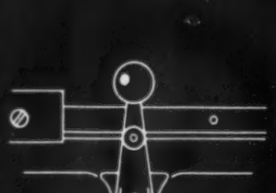
3

Microsphere Wheel Spindle Bearings—This exclusive Landis Tool development permits the wheel spindle to run true and smooth. The spherical shape makes the bearing self aligning under all load conditions. The babbitt lined steel bearing is split. This permits use of a method whereby bearing clearance can be set exactly and a calibrated setting adjusted later to compensate for wear. This eliminates any possibility of chatter marks on the work due to spindle vibration.



4

Automatic Wheel Feed—Dimensional accuracy and smoothness of operation are assured by the hydraulic operation of the automatic wheel feed. Cushioning valves at each end of the wheel feed cycle prevent jarring or vibration. An automatic compensating device balances any changes in oil viscosity and makes operation independent of change in oil temperature.

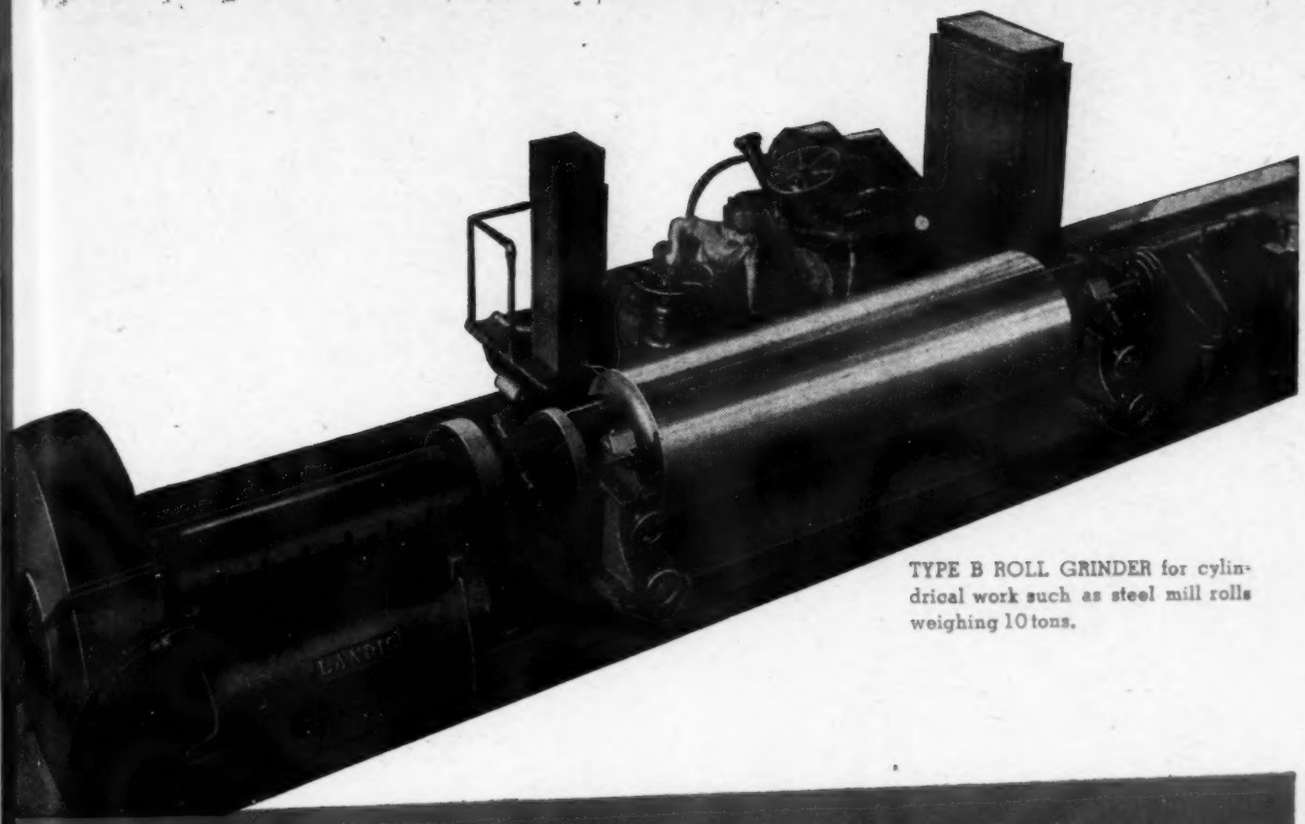


5

Hydraulic Table Traverse—The work table is traversed smoothly by hydraulic power. Speed is adjustable from 3″ per minute to 360″ per minute. Reversing is shockless and accurate with cushioning valves and sensitive reversing mechanism. Tarry time before reversal is also adjustable to grind the work to size and clear itself for the new cut.

6

Factory Tested—After assembly every machine is given an operating test. It is set up and run just as it will be in your shop. This gives a final double check and 100% inspection of all machines before shipment.



TYPE B ROLL GRINDER for cylindrical work such as steel mill rolls weighing 10 tons.

Precision Grinders

produce to close tolerances with fine finishes

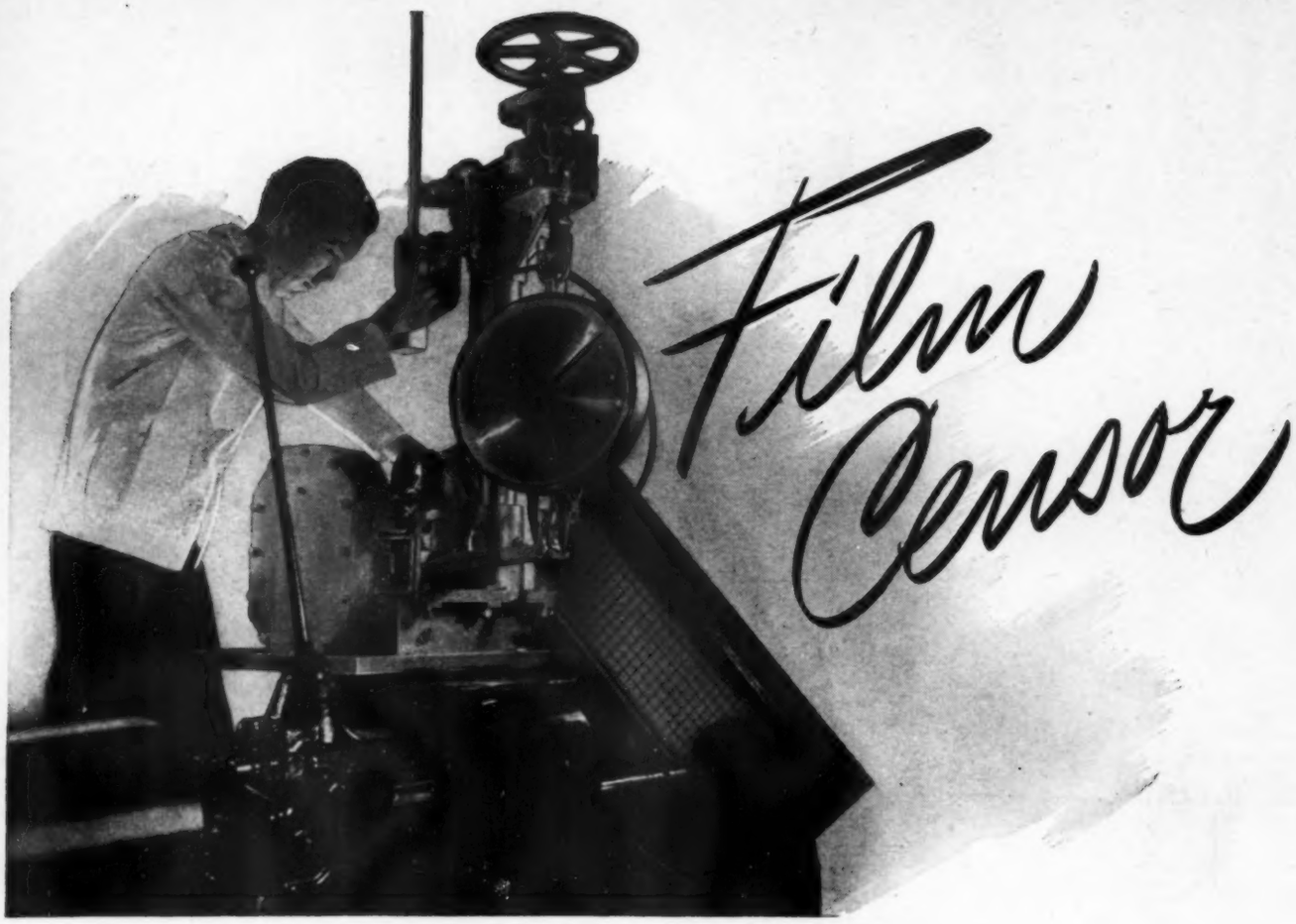
Whether you are grinding parts for watches or steel mill rolls, you will find that Landis Tool Precision Grinders will enable you to work to the closest tolerances with fine unmarred finishes. We have listed six of the many good reasons for these results. In addition, there are many high production features of Landis Tool Grinders that make them cost cutting tools.

If you have a precision grinding problem, we would like to show you what these "6 good reasons" can mean to you. 64

4" TYPE H PLAIN HYDRAULIC GRINDER for mass production of precision small parts.

LANDIS TOOL
Precision Grinders

LANDIS TOOL COMPANY, WAYNESBORO, PA.



The alert technician in the illustration is censoring film—the strength of film in **Sinclair** industrial lubricants designed for protection of your valuable machinery.

These tests prove that Sinclair lubricants have the film strength to keep moving metal parts separated under extreme temperature and pressure conditions. With the SAE film strength test machine, skilled laboratory technicians check constantly, reject substandard product, assure you of essential protection.

Every batch of lubricant in process gets an equally careful check for other all-important qualities. Constant research by Sinclair assures you of the benefits of new developments in film strength... and in all other prime lubricant qualities.

Sinclair Metal Cutting Oils

(Embodying Film Strength Characteristics)

ORDNANCE OILS

Permit deeper cuts at higher speeds

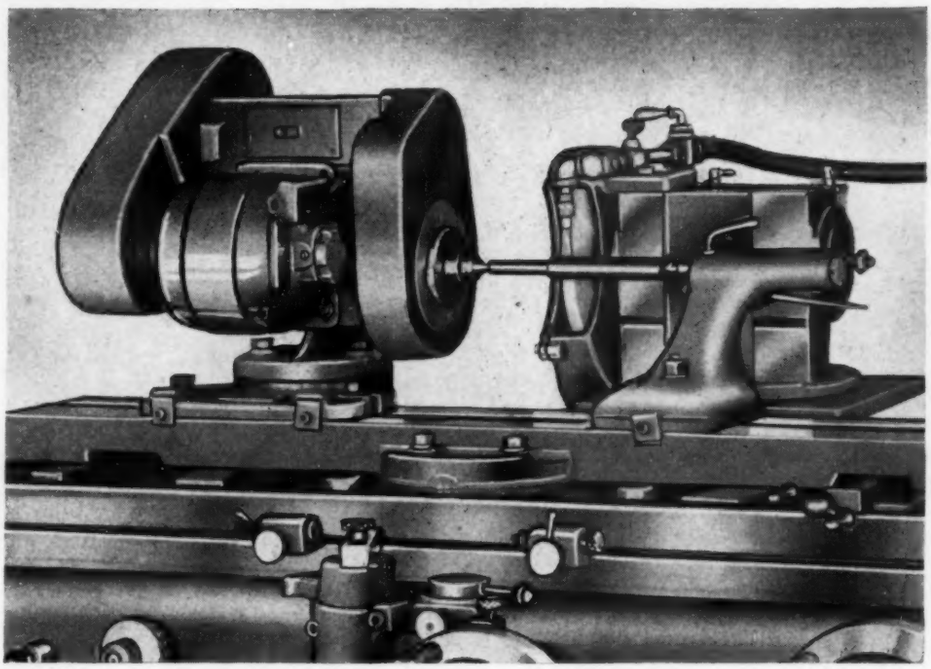
SINCLAIR REFINING COMPANY • 630 FIFTH AVENUE, NEW YORK 20, N. Y.

SINCLAIR

Lubricants for Industry

FINEST CRUDES + EXPERT RESEARCH and MANUFACTURING CONTROL = OUTSTANDING PERFORMANCE

1 of 100 JOBS YOU CAN DO BETTER WITH A COVEL NO. 22 - - -



Write today for 29-page catalog No. A-67, complete details on the No. 22 and full line of cost-cutting attachments.

DEAD CENTER CYLINDRICAL GRINDING

To Finer Tolerance . . . . . .

With a Covel No. 22 Universal Cutter and Tool Grinder, you turn out intricate cylindrical grinding jobs to .0005" tolerances faster with less down time . . . quicker set-ups . . . and low initial investment . . . on a machine fitted for every type of tool grinding. To cut costs in your tool room, see your nearest Covel Dealer or write direct to Covel Manufacturing Co., Benton Harbor, Michigan.

COVEL MANUFACTURING CO.
BENTON HARBOR, MICHIGAN, U.S.A.

COVEL
INDUSTRIAL GRINDERS

DETROIT PUBLIC LIBRARY

What's Your Drill-Bill

ON JOBS LIKE THESE?

...drilling Magnesium, Brass and other Non-Ferrous Metals
...Plastics, Slate, etc.

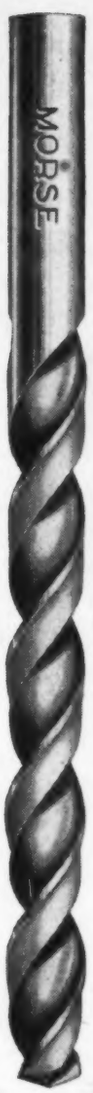
HERE ARE SPECIAL-PURPOSE MORSE TWIST DRILLS TO CUT YOUR JOB-TIME AND YOUR COSTS

WHEN it comes to drilling Brass, die-cast metals and other non-ferrous metals or plastics and slate, Morse special-purpose drills *prove their worth.* They give faster production and last longer.

For like *all* Morse cutting tools . . . Morse drills, standard or special, are designed to do specific jobs better. They are made to exact specifications . . . length, diameter and twist-cut . . . to perform best when used for their specific applications, under proper conditions.

So no matter what your drill problems, look to *Morse* for the drill that will give you maximum performance at lowest drill-cost. Remember too, that Morse Engineering — backed by over 80 years of drill making and drill-use experience — can help you increase production and make *substantial* savings. Your Industrial Supply Distributor will co-operate in securing a Morse specification.

Morse Bakelite Drills (1361) ... for bakelite, ebonite, asbestos, fibre, brass, hard rubber, various molded plastics. Withstands strong abrasive action.



Morse Quick-Twist Drills (1363) ... High-speed steel for deep-hole drilling in aluminum, magnesium, die-cast metals; for slate and certain plastics. Especially suited for use in screw machine work.

Morse Brass Drills (1344) ... specially designed for brass work. Made with wide flutes to clear chips easily. Slow helix angle prevents drill from hogging into material.

Morse Cotter-Pin Drills (1386) ... for copper, brass castings, aluminum and magnesium. Especially good for skin-metal drilling of non-ferrous metals used in aircraft and other types of manufacturing. Also used in portable electric drills.

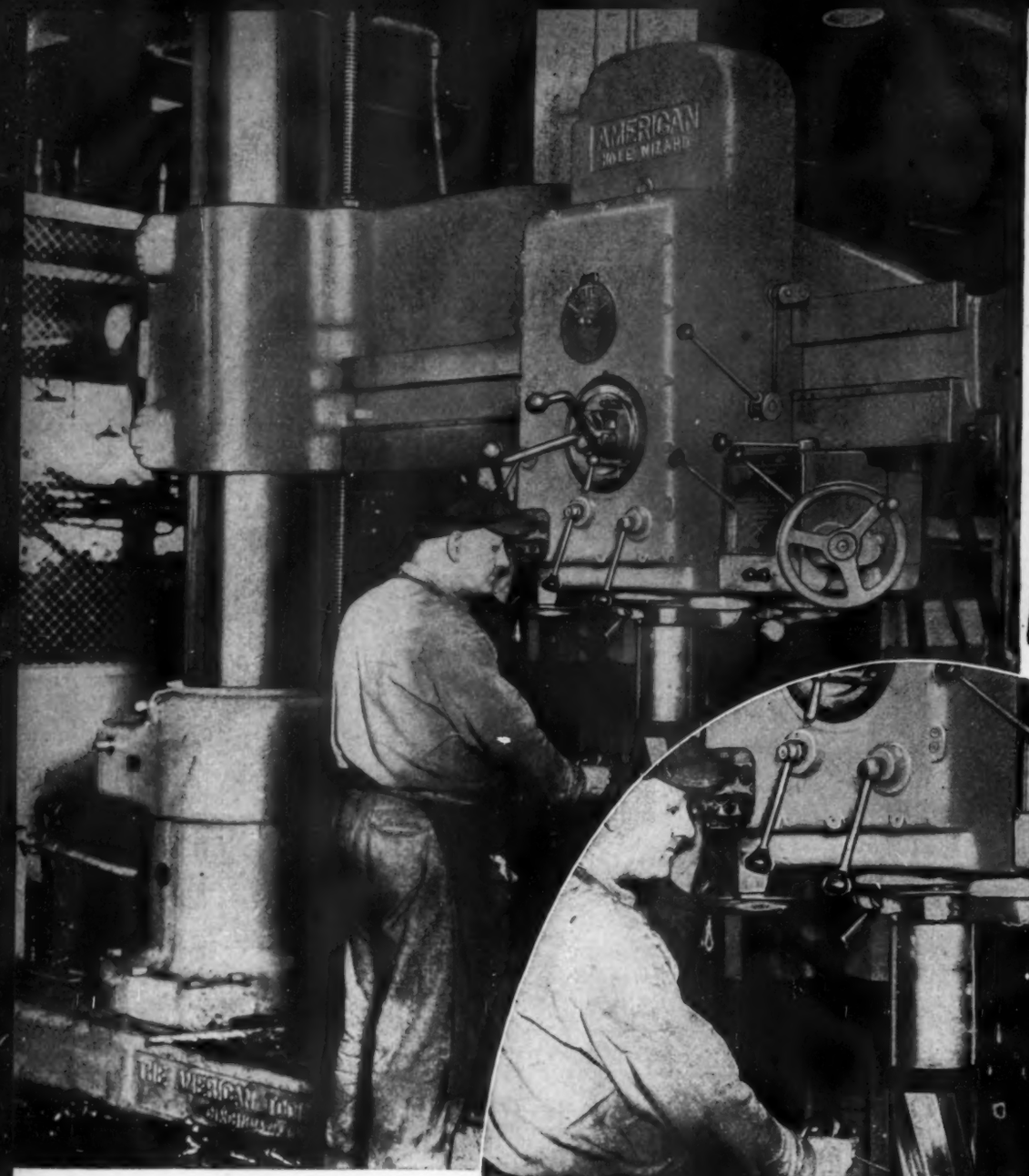
Accuracy, Quality, Uniformity: the MORSE Code of Cutting-Tool Manufacture

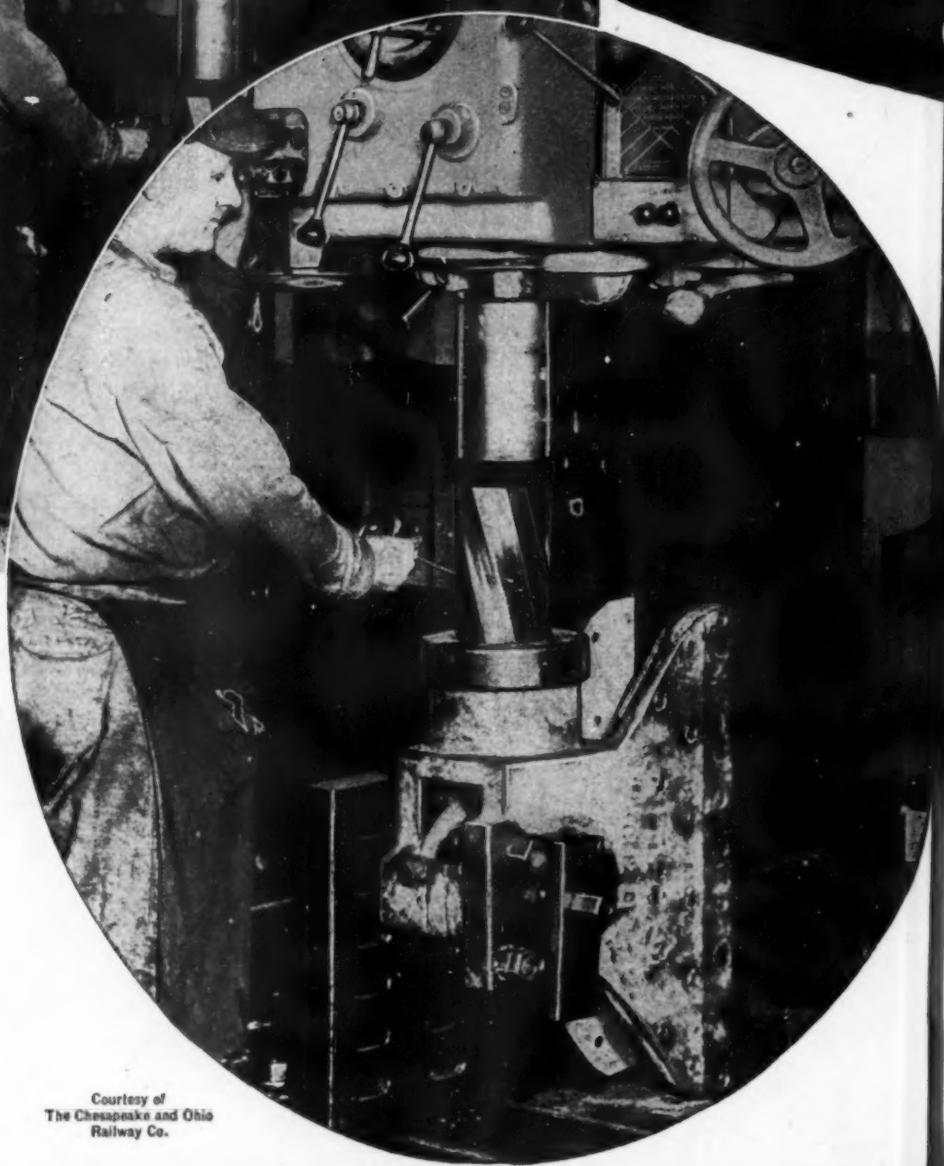
MORSE TWIST DRILL & MACHINE COMPANY

The Original Manufacturer of Twist Drills

NEW BEDFORD, MASSACHUSETTS

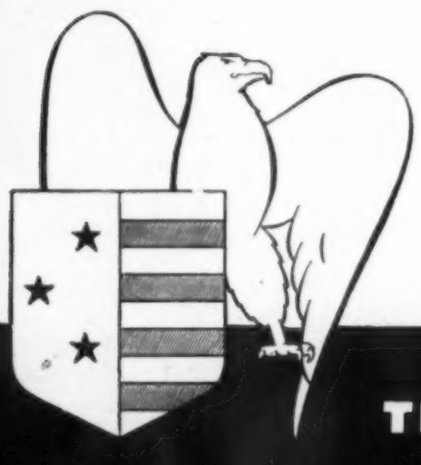
NEW YORK STORE: 130 LAFAYETTE ST. • CHICAGO STORE: 570 WEST RANDOLPH ST. • SAN FRANCISCO STORE: 1180 FOLSOM ST.





Taper reaming locomotive cross heads for piston rod fits.

Courtesy of
The Chesapeake and Ohio
Railway Co.



THE AMERICAN TOOL WORKS CO

The Acid Test of SPINDLE CONSTRUCTION

Reaming cross heads for piston rod fits is about the toughest job you can find for a radial drill spindle.

This work must be done at slow speeds, without chatter and with a fine finish.

IT'S A TOUGH ONE BUT—

1 **The boring mill construction of the "American" Hole Wizard Spindle does the job. Its 100% anti-friction design with adjustment for wear insures frictionless operation and maintenance of original accuracy.**

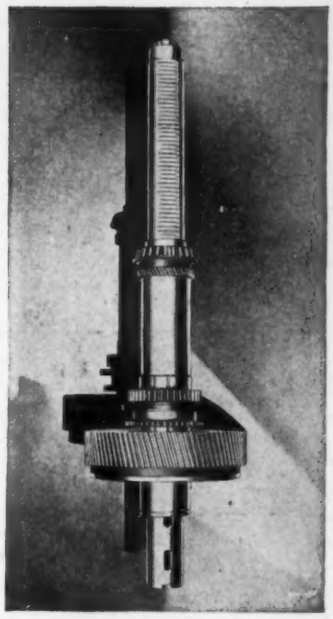
2 **The patented Double Lo-Hung Spindle Drive locates the large diameter driving gear at the bottom of the head close to the work, thus minimizing spindle torque.**

3 **The large diameter spindle, recently increased to add 37% to its rigidity, easily resists the enormous torsional effort imposed by this job.**

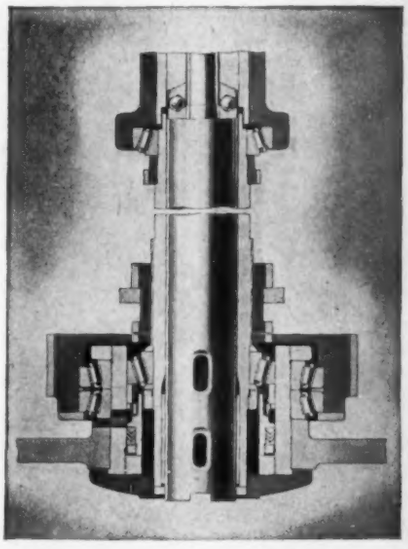
4 **Spindle shake is reduced to an absolute minimum by allowing only .00025" freedom between the ground nitrided spindle and the honed nitrided spindle sleeve. This is especially valuable on accurate boring operations.**

These four spindle characteristics are YOUR assurance that YOUR tough ones will be done easier, quicker and cheaper with an "American" Hole Wizard on the job.

Civilian goods and services must be produced in greater quantities and at lower costs. The "American" Hole Wizard Radial definitely is a contributor to this cause.



Patented Double Lo-Hung Spindle Drive.

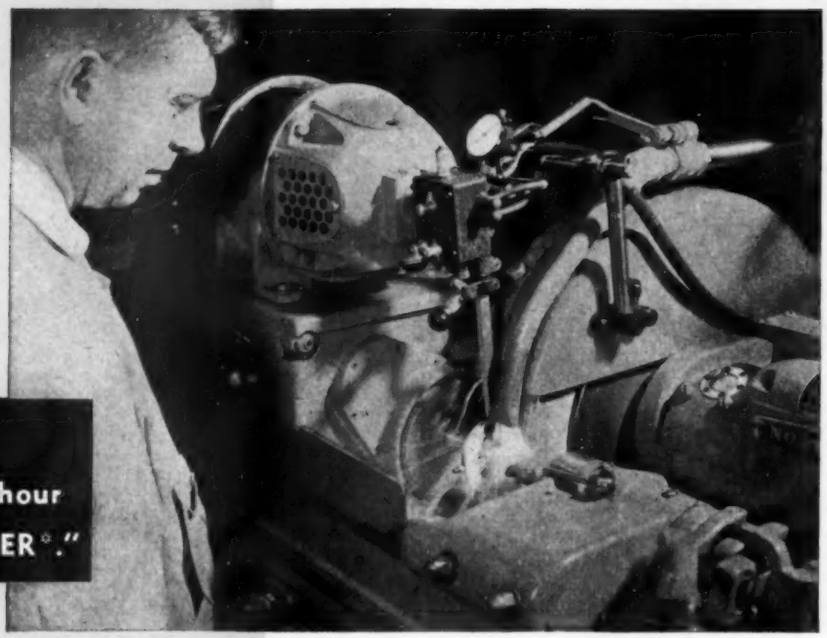


Patented Double Lo-Hung anti-friction spindle mounting.

BULLETIN 327 TELLS THE STORY . . . YOURS FOR THE ASKING

CO *Lathes and Radial Drills* **Cincinnati, Ohio U.S.A.**

Problems with Sizing?



The Operator Says

"Grinding to .0001" hour after hour is a cinch with the NORTONIZER®."

The Superintendent Says

"The NORTONIZER® sure cuts costs and improves quality control."

The NORTONIZER* is the Solution for Close-limit, Plunge-grind Jobs!

Operator: "Yes sir! It's a cinch to grind to a 'tenth' hour after hour with the NORTONIZER*. All I have to do is load, start the cycle, put the caliper on, and let 'er grind. When she's to size, the wheel backs off automatically, ready for me to unload. And the work's right on the button each time — no trouble passing a tough inspector."

Superintendent: "Yes sir, the NORTONIZER* sure is a cost-saver. Because it sizes automatically, inspection is greatly speeded up. And because it sizes so accurately — right to a 'tenth' each time — scrap is almost nil, even with operators of only average skill. It's the best answer I know of for getting real production-precision at low cost."

NORTON COMPANY, WORCESTER 6, MASS.

New York - Chicago - Detroit - Cleveland - Hartford

Distributors in All Principal Cities

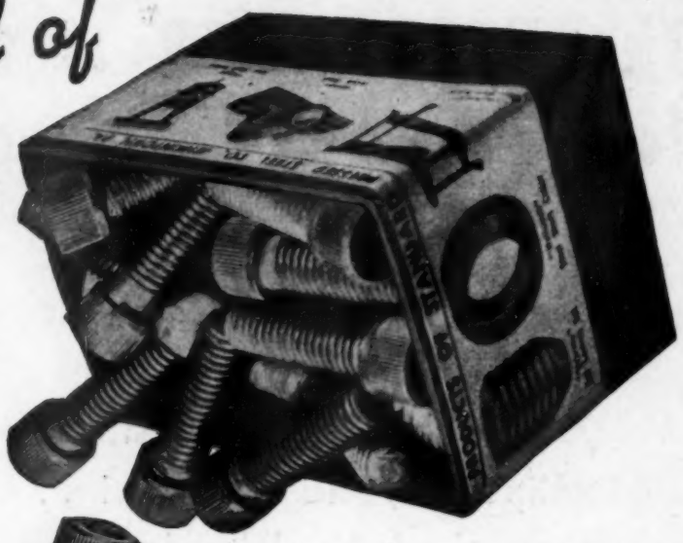
M-537

NORTON GRINDERS and Lappers

*Trade-mark for Norton Automatic Work Sizing Device

You get a boxful of

TIME-SAVERS
plus
UTILITY, STRENGTH AND ACCURACY
when you *BUY*



UNBRAKO

Reg. U. S. Pat. Off.

KNURLED SOCKET HEAD CAP SCREWS

Time-Savers because the knurled head provides a slip- and fumble-proof grip, even for oily and greasy fingers; the "Unbrako," therefore, can be screwed-in faster and farther before it becomes necessary to use a wrench.

Utility, Strength and Accuracy, because they are carefully controlled during manufacture.

These features make their use increasingly wide spread. Write for the "Unbrako" Catalog of Socket Screw Products.

"Unbrako" and "Hallowell" Products are sold entirely through distributors.

PAT'D & PATS. PEND.

"Unbrako" Socket Set Screw with knurled cup point is a Self-Locker because its knurled point digs in and stays tight even subjected to the most chattering vibration. Yet, it can easily be backed-out and used over and over again. These and the Socket Head Cap Screws are available in sizes from #4 to 1½".

KITS: PATS. PEND

You can't screw socket screws in or out without a hex socket wrench—so why not get our No. 25 or No. 50 "Hallowell" Hollow Handle Key Kit which contains most all hex bits.

Knurling of Socket Screws originated with "Unbrako" in 1936.

OVER 44 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA., BOX 4 • BRANCHES: BOSTON • CHICAGO • DETROIT • INDIANAPOLIS • ST. LOUIS • SAN FRANCISCO

HERE'S SOMETHING *NEW* IN TOOL KITS TO SAVE YOU *Minutes* AND *Money!*

duMONT'S *Minute Man* KEYWAY BROACH KIT

Think how often you have keyways to cut in gears, milling cutters, pulley hubs, collars, couplings, etc.

With this *Minute Man* Set you can cut any standard width, any depth keyway *in one minute!* You simply select the right bushing for the bore, insert the broach in the bushing slot, place it under the arbor press and press it through, using a shim and second pass to get the exact depth desired. It's done in a tiny fraction of the time it would take to set up a machine for the job. Broaches, shims, bushings, keyway stock are all right there in the set.

Minute Man Keyway Broaches and Kits are sold only through Mill Supply Distributors.

Let us mail you the name of the nearest distributor together with our new Catalog "A" containing complete information and prices on all sizes of Broaches and Kits and a lot of valuable reference information.

The du MONT CORPORATION

GREENFIELD, MASSACHUSETTS

To say the least . . . . *we were*

. . . . . .

UNITED STATES

flabbergasted!

. . . . . we thought EVERYBODY knew we furnish alloy steel in forging ingots and blooms

IMAGINE our embarrassment when we discovered the other day that one of our customers, who's been buying Carilloy Steel bars and billets from us for years, had been going elsewhere for large rolled blooms and forging ingots—because he didn't know we produced them for sale.

We're inclined to believe this man is a rare exception. But just to be on the safe side—and in case YOU missed our story in the past—we're going to repeat what we've been telling steel users year after year. Namely:—

"Carnegie-Illinois is prepared to furnish constructional alloy steels in ALL forms. Not only in the usual bars and billets but in strip, sheets, plates, sketch plates, structural sections, coiled bars, spring flats, special sections and in large rolled and forged blooms and forging ingots as well—either in electric furnace or open hearth steel."

Carnegie-Illinois can produce these different forms in any alloy composition, as regular quality steel or to the highest quality requirements — Aircraft Quality, Bearing Quality, Rifle Barrel and Gun Quality, and any other special quality.

These different alloy forms, grades or qualities are produced in most cases in both our Pittsburgh and Chicago mills. So, whether you're located in the East or West, we have the producing and finishing equipment to meet all specification demands and are able to take care of your Alloy Steel requirements, *completely*.

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York

7-313

Did you know?

. . . That during the war, Carnegie-Illinois alloy steel production exceeded any other single producer's.

. . . That Carnegie-Illinois produced almost all of the Hadfield Manganese sheet steel helmet blanks.

. . . Devised methods of annealing that permitted Carnegie-Illinois to produce almost 50% of the hot rolled armor piercing shot steel.

. . . Contributed more to the conservation and recovery of alloying elements from turnings than any other alloy steel producer.

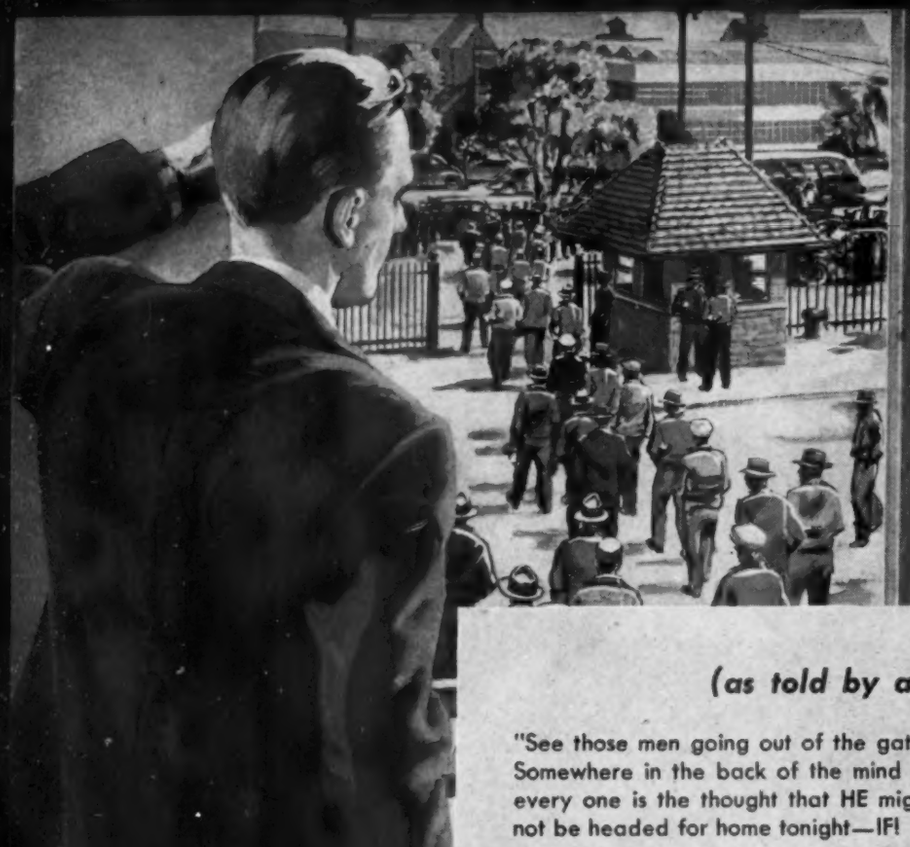
U·S·S Carilloy Steels

USS STEEL

ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

S T E E L



Why HOME

(as told by a personnel director)

"See those men going out of the gate? Somewhere in the back of the mind of every one is the thought that HE might not be headed for home tonight—IF!

"You see, some of our operations are extremely dangerous. Our accident rate used to make me sick.

"It made the men down in the plant sick, too, every time we had a serious accident. They were scared all the time. And those accidents cost us plenty.

"Three years ago we placed our workmen's compensation with Employers Mutuals. They sent in their Safety Engineers —and those fellows do know their stuff. We thought we knew something about safety—but those engineers were way ahead of us.

"Today we've got a real Safety Program. Accidents just quit happening. It seemed almost like a miracle!

"If it hadn't been for that Safety Program, one hundred and sixty-three of those men going home to supper now would have been killed this year, or laid up in the hospital, or maybe crippled for life. Right here in this plant!

"They're pretty good guys, too."

For the benefit of policyholders . . .

Employers Mutuals have a long experience as one of the largest carriers of workmen's compensation (they wrote one of the first policies ever issued). Their constant effort to provide for the welfare of policyholders has given them unusual insight into the needs of employers and of their employees. To serve those needs, they have developed Safety Engineering and other services, in order to reduce the number of accidents to employees, and to provide care for injured employees.

You can reduce your insurance costs

All these services are available to you, to reduce your accident frequency and accident severity, thereby reducing the cost of your insurance.

In addition, all savings made through sound, conservative management, over and above provision for ample reserves and surplus, are returned to policyholders in the form of dividends —a further reduction of your insurance costs.

Employers Mutuals write:

Public Liability . . . Automobile . . . Plate Glass . . . Burglary . . . Workmen's Compensation . . . Fidelity Bonds . . . Group Health, Accident, Hospitalization . . . and other casualty insurance . . . Fire . . . Tornado . . . Extended Coverage . . . Inland Marine . . . and allied lines of insurance. All policies are nonassessable. Branch offices in principal cities. Consult your telephone directory.

EMPLOYERS MUTUALS of WAUSAU

163 men WILL BE FOR SUPPER TONIGHT

This leader in Safety Engineering can reduce YOUR accident rates . . . and save you money, too

Employers Mutuals nationally known achievements in Safety Engineering result from the basic principle guiding these progressive companies—to operate for the benefit of the policyholders and their employees.

E-M Safety Engineers were first put to work because high accident rates made workmen's compensation insurance costs a burden to employers. And insurance costs are only the beginning of the price you pay for accidents.

Other costs include lost production, spoiled material and broken machinery, replacement of trained workers, lowered efficiency of others who see an accident—talk about it—are fearful of their own safety.

Get safety-on-the-job

E-M Safety Engineers have developed an efficiently planned and coordinated program that can build safety-on-the-job for you—from the ground up.

Engineers survey your plant to analyze the hazards surrounding your employees. Engineering specialists on various machines and industries, chemists, industrial nurses all play their part in such a survey. They make recommendations for eliminating these hazards.

Engineers help you set up a safety program. They provide practical suggestions, posters, literature, films, and other help. Safety education helps your men understand the fundamental principle of safety-on-the-job—that taking time to be safe saves time—and lives.

The Industrial Hygiene department and a staff of industrial nurses help eliminate the causes of occupational diseases. The Employers Mutual nurse will help you set up an efficient first aid department.

E-M Safety Engineering has reduced accident rates as much as 60% to 75%. Even in exceptionally hazardous industries, accidents can be brought under control.

Another service to policyholders and their employees is the effective use of modern physiotherapy laboratories when serious accidents *do* occur. Physiotherapy frequently reduces the time lost following a severe injury, and over and over again has prevented permanent disability.

Ask an Employers Mutuals man for an engineering survey of your plant and recommendations for the safety program you need to reduce your accident rates.

FREE: Write for complete information on Safety Engineering, and for a copy of "A Dictionary of Insurance Terms—How to Understand Insurance and Buy It Intelligently." Write on your business letterhead to: Insurance Information Bureau, Employers Mutuals of Wausau, Wausau, Wisconsin.

GET THIS E-M RISK ANALYSIS ON YOUR PUBLIC LIABILITY HAZARDS

Employers Mutuals engineers can show you, through a Survey and Risk Analysis, how to eliminate most of the hazards that might result in injury to members of the public on your premises or through the operations of your business.

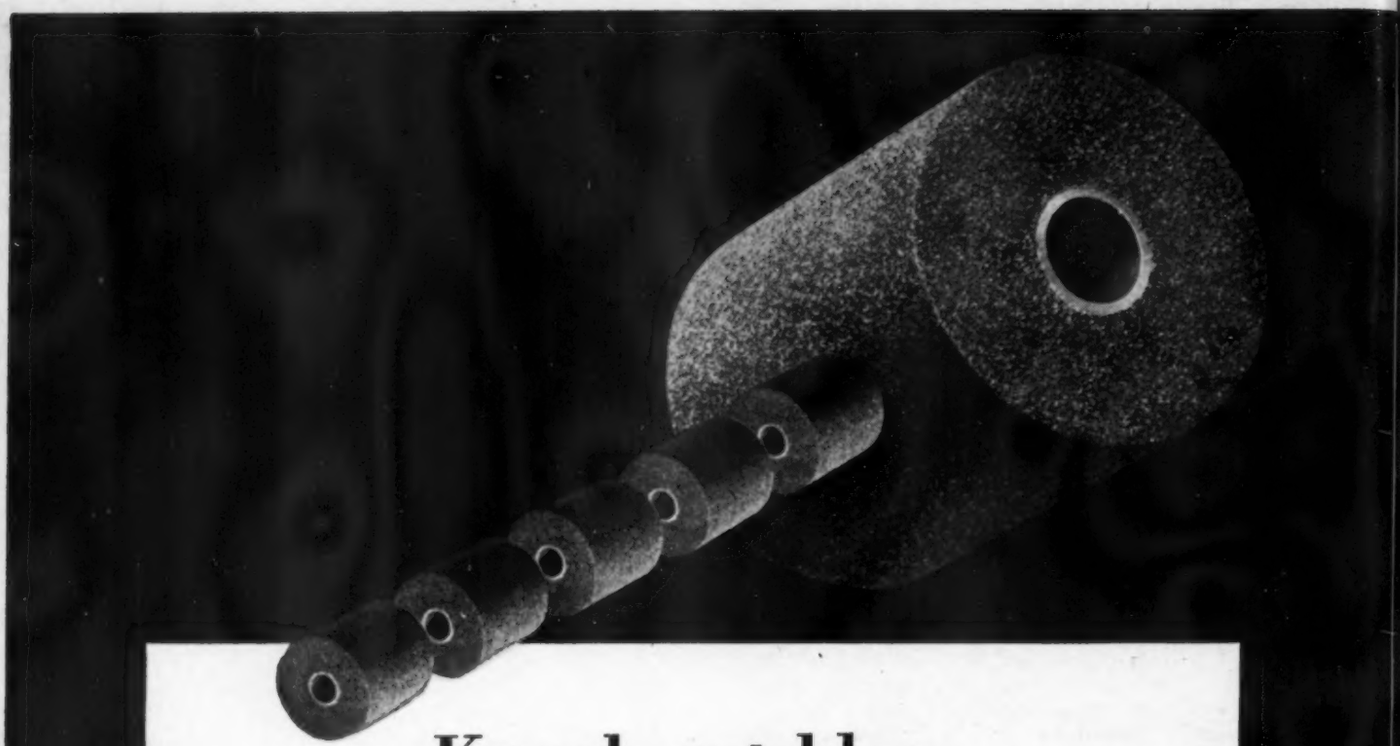
Employers Mutuals combine in one comprehensive policy the several forms of public liability protection needed by manufacturing, mercantile, and contracting firms—protection against claims arising from all the usual and all the unusual chances of loss through bodily injury and damage to property of others.

Only after a survey of the hazards can the proper form of this comprehensive policy be recommended. Then, Employers Mutuals tailor the policy to provide the coverage needed.

Ask the Employers Mutuals man to make a Survey and Risk Analysis of your public liability requirements. This analysis involves no obligation.

. . . make Insurance Understandable

EMPLOYERS MUTUAL LIABILITY INSURANCE COMPANY OF WISCONSIN
ESTABLISHED 1911
EMPLOYERS MUTUAL FIRE INSURANCE COMPANY
ESTABLISHED 1935
Home Office: WAUSAU, WISCONSIN



Knock-out blow to high production costs

Would you like to knock your production costs for a loop?

One way is to change to a more efficient grinding operation. Maybe your grinding methods are not as good as they might be. Maybe something better for your grinding machines will save you time and money. Maybe your grinding wheels can be improved.

For 58 years, men in your industry have been learning how to cut grinding costs by consulting Peninsular engineers. The opportunity is there for you, too.

Call in Peninsular engineers. They will study your grinding thoroughly. From this study, they will develop grinding wheel formulas for the best possible results at the lowest possible costs. *Every* Peninsular grinding wheel is specially made for its particular job.

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Newark, Pittsburgh, Houston, St. Louis, Cincinnati.

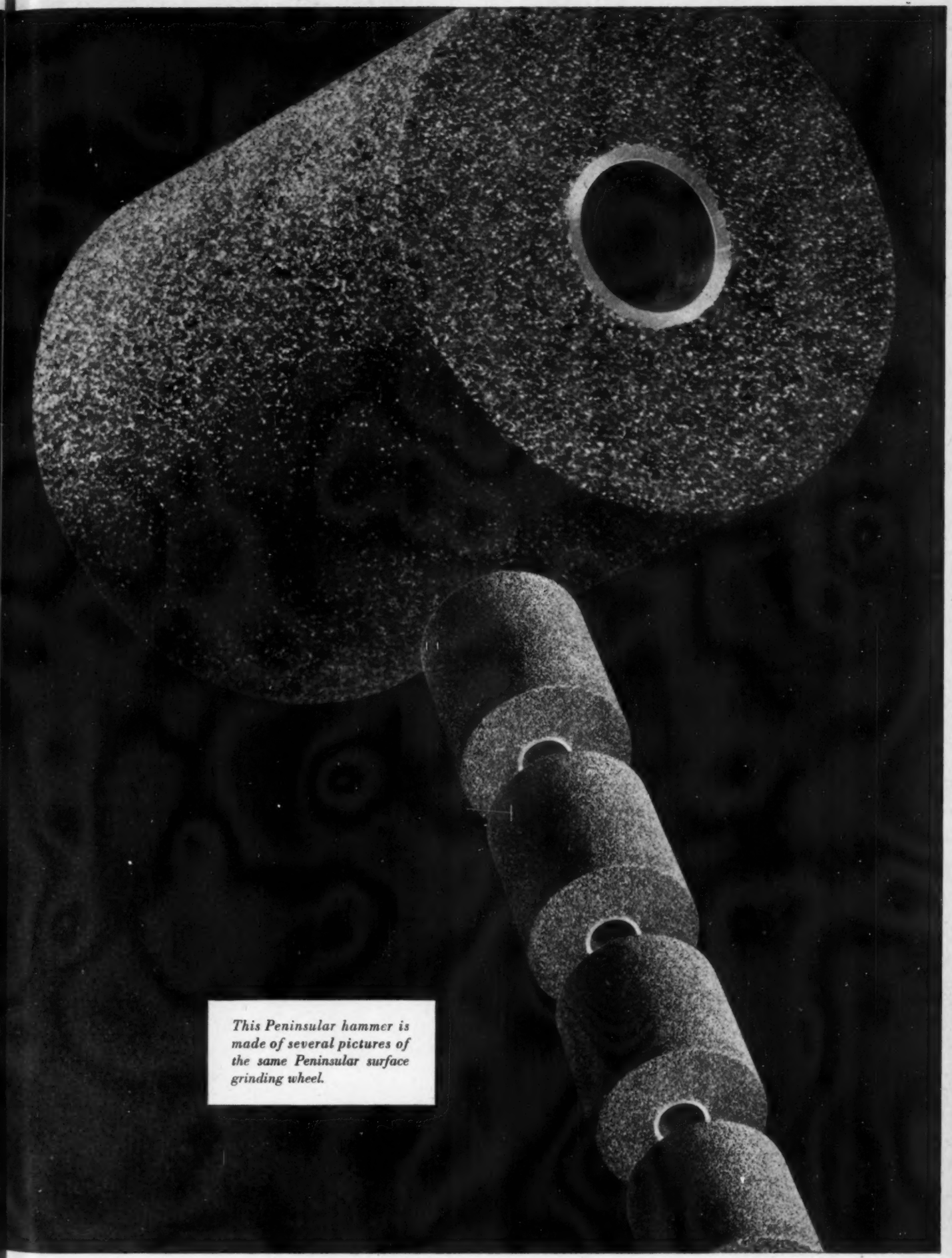
PENINSULAR

INDIVIDUALLY PENINSULAR ENGINEERED

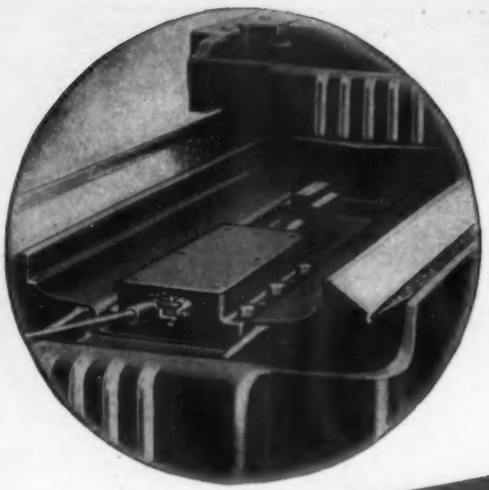
GRINDING WHEELS

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS



This Peninsular hammer is made of several pictures of the same Peninsular surface grinding wheel.



Designed for greater safety at higher speeds

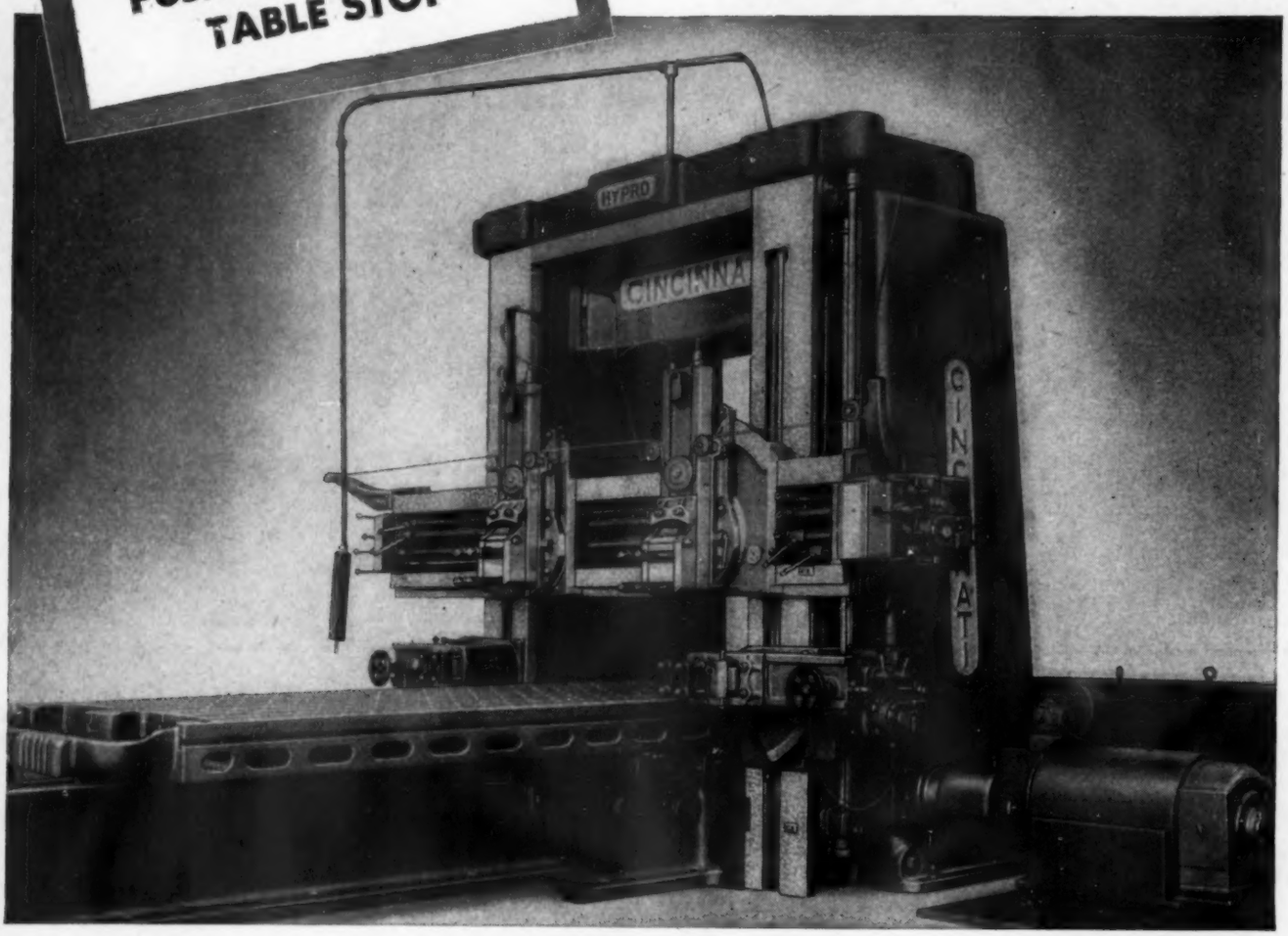
It is now possible to obtain a positive hydraulic safety stop and jack to completely protect anything around the machine in case of complete failure of the electrical control.

This safety stop is designed to stop the table quickly in case of control failure with a uniform decelerated motion without severe shock to parts of the Planer. All parts are completely enclosed to protect them from dirt and chips so there is no chance of failure.

This stop also is used as a jack for relocating the table over the bull wheel by inserting a handle in the stop and pumping the table back to its running position. No crane or other means, therefore, is required for this operation which invariably results in damage to the gear teeth.

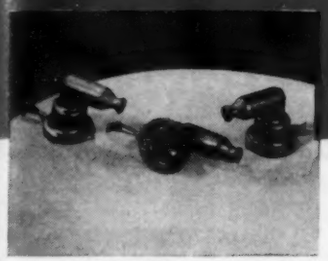
After the stop is used it automatically resets itself. The operator or maintenance department does not have to replace any parts or reset any mechanism, thereby saving time and eliminating the human element.

HYPRO PLANER
Positive Hydraulic TABLE STOP

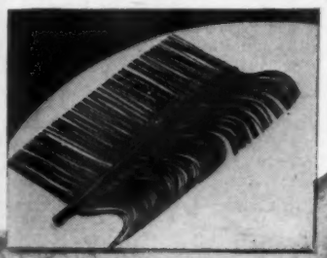


THE CINCINNATI HYPRO PLANER COMPANY
PLANERS · BORING MILLS · PLANER TYPE MILLERS
CINCINNATI, OHIO

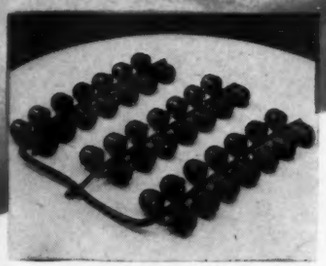
Want LOW-COST Rubber Parts?



Spark Plug Covers



Gaskets

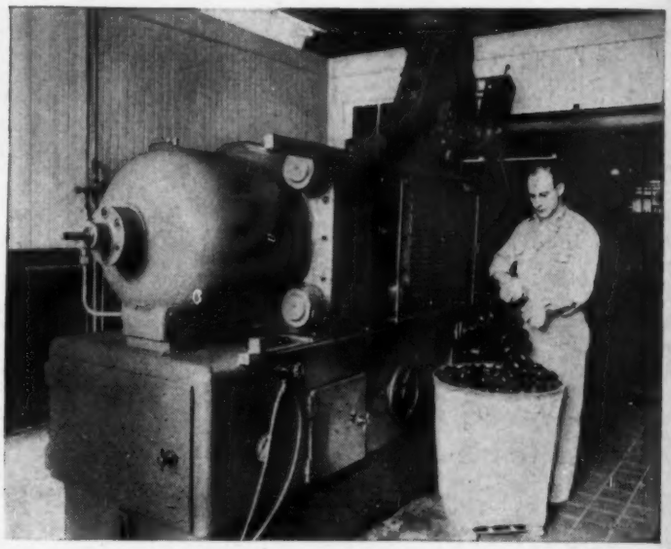


Automobile Snubbers

Ice Cream Cabinet Lid

Packing Rings & Joint Covers

Milking Machine Tubes



Here's the machine that will give them to you! The H-P-M Turbojector is a completely self-contained injection molding machine, requiring only electric power and cooling water connections to put it in operation. The cycle is *entirely automatic.* Rubber stock is readily available from established sources.

Preforms are entirely eliminated; curing time is greatly reduced. You'll have no expensive trimming, because there's no flash on parts molded with an H-P-M Turbojector.

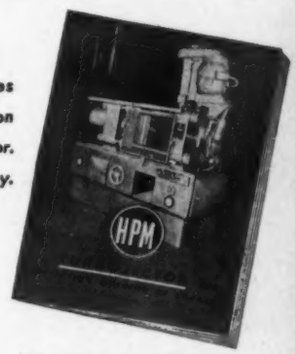
If you use rubber parts, you can get them when you want them, at the lowest possible cost, by installing your own H-P-M Turbojector. It's a *complete* rubber parts department in itself! Write today, stating your rubber molding requirements.

THE HYDRAULIC PRESS MANUFACTURING CO.

1014 Marion Road, Mount Gilead, Ohio, U. S. A.

Branch Offices in New York, Philadelphia, Cincinnati, Cleveland, Detroit and Chicago. Representatives in other principal cities. Export Dept., 500 Fifth Ave., New York, N. Y. Cable-"Hydraulic".

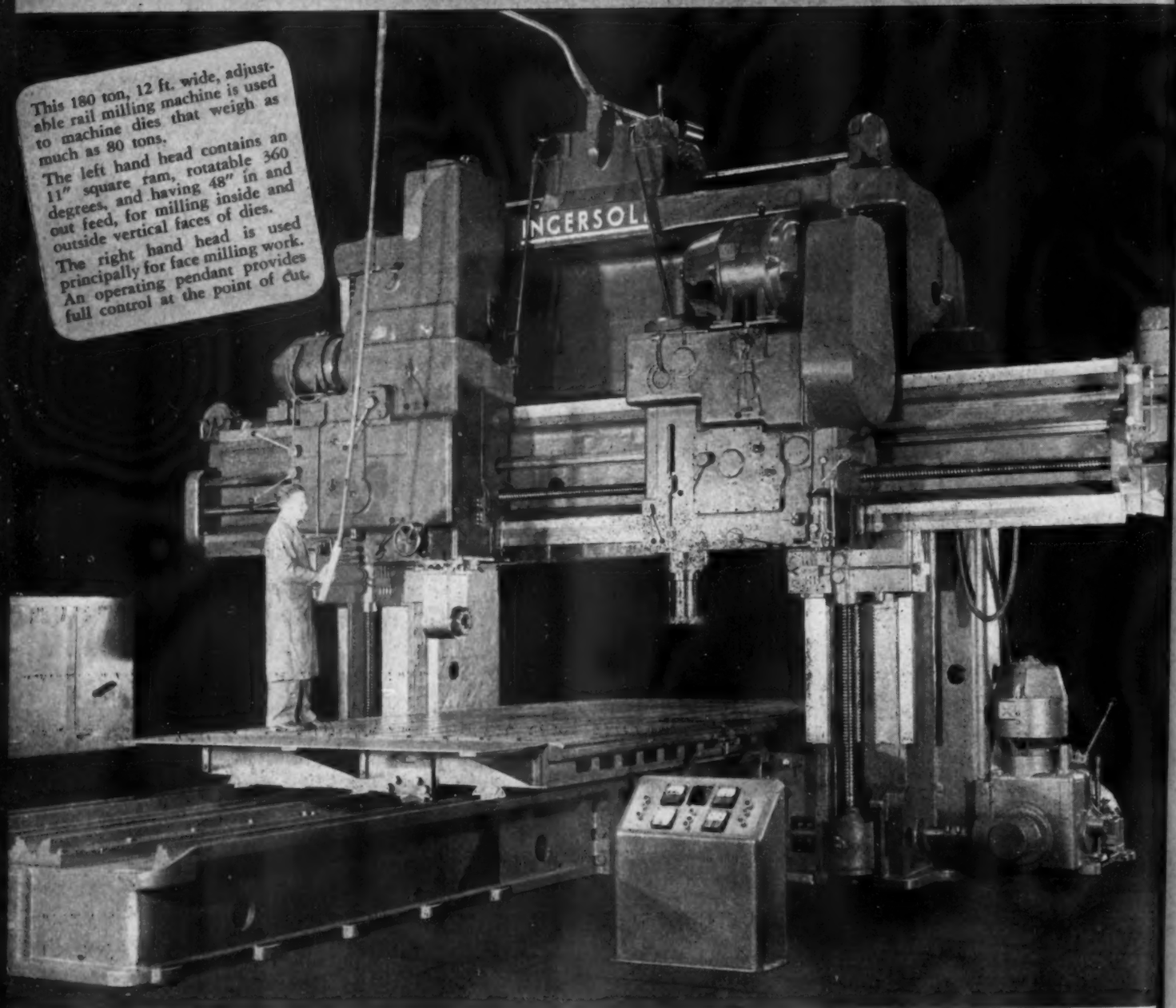
Bulletin 4601 gives complete details on the H-P-M Turbojector. Write for your free copy.



HPM **TURBOJECTOR** FOR INJECTION MOLDING OF RUBBER

REVOLUTIONIZING PRODUCTION WITH HYDRAULICS SINCE 1877

A Few Typical Machines
by
INGERSOLL



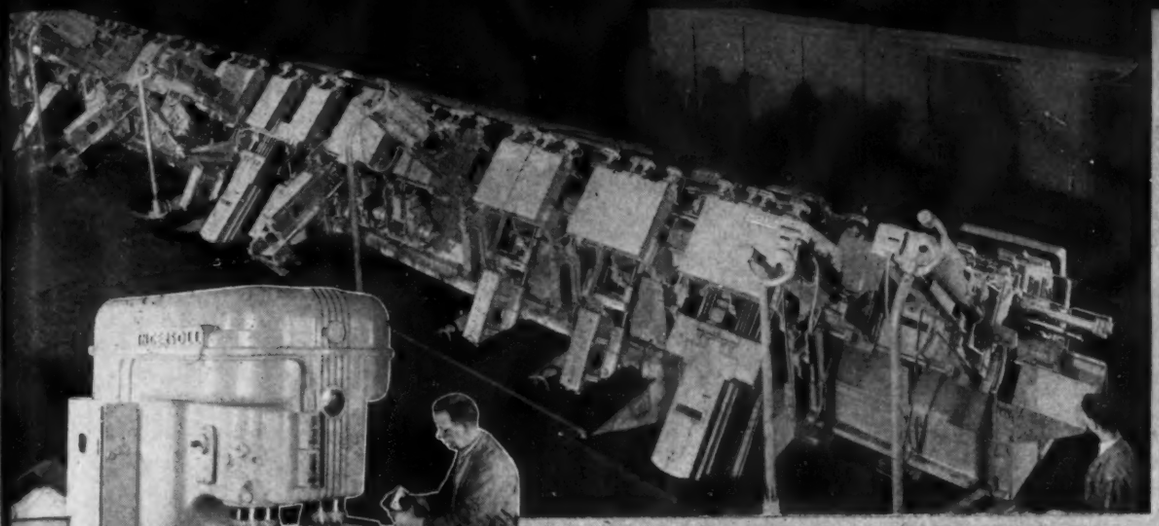
This 180 ton, 12 ft. wide, adjustable rail milling machine is used to machine dies that weigh as much as 80 tons.

The left hand head contains an 11" square ram, rotatable 360 degrees, and having 48" in and out feed, for milling inside and outside vertical faces of dies.

The right hand head is used principally for face milling work. An operating pendant provides full control at the point of cut.

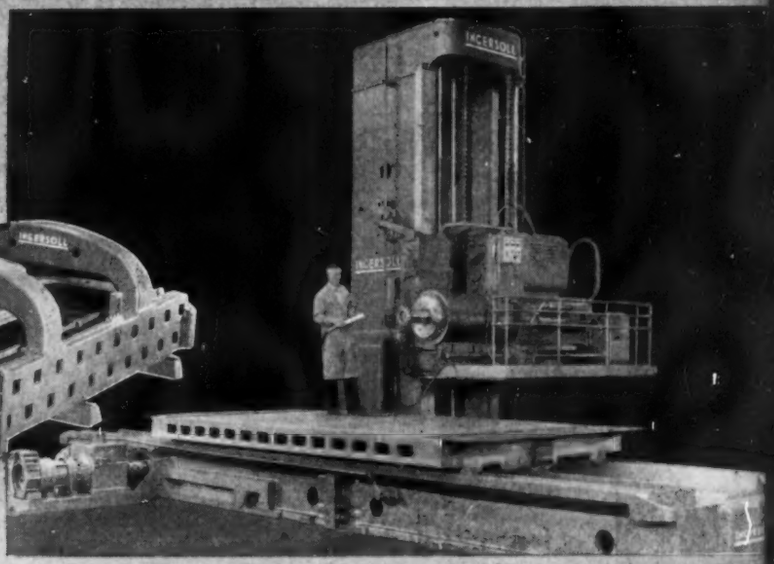
The experience gained in building the machines illustrated on these two pages is available to you upon request.

THE INGERSOLL MILLING

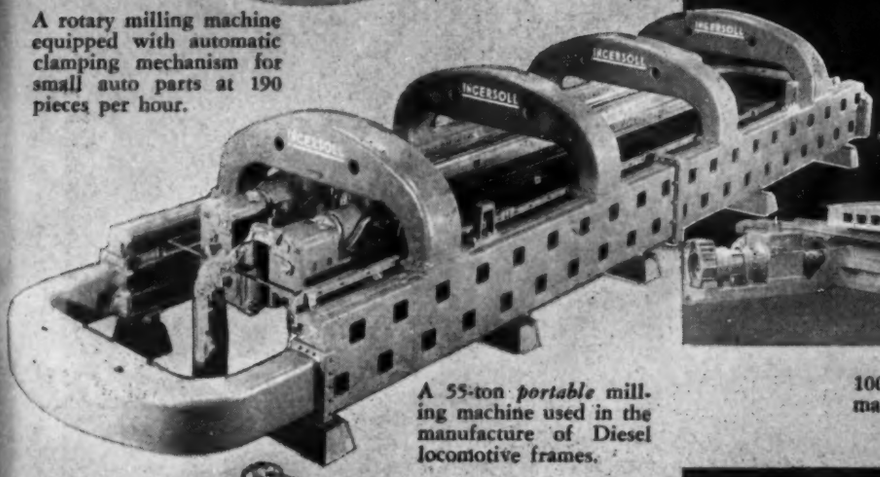


An 80 ft. long, 24-station process machine that performs 170 drilling, tapping, and milling operations at rate of 100 auto transmission castings per hour.

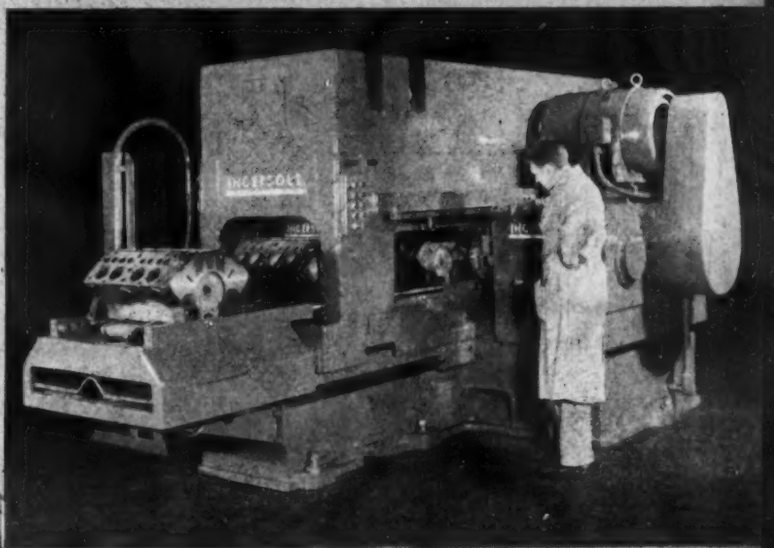
A rotary milling machine equipped with automatic clamping mechanism for small auto parts at 190 pieces per hour.



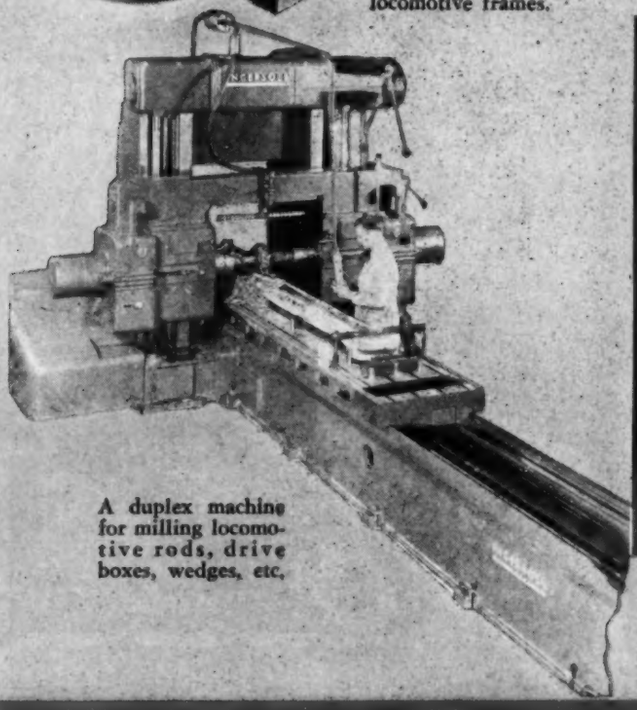
100-ton openside milling and boring machine used by a prominent die maker.



A 55-ton *portable* milling machine used in the manufacture of Diesel locomotive frames.



A 2-station, 4-spindle machine for milling ends of 63 cylinder blocks per hour.

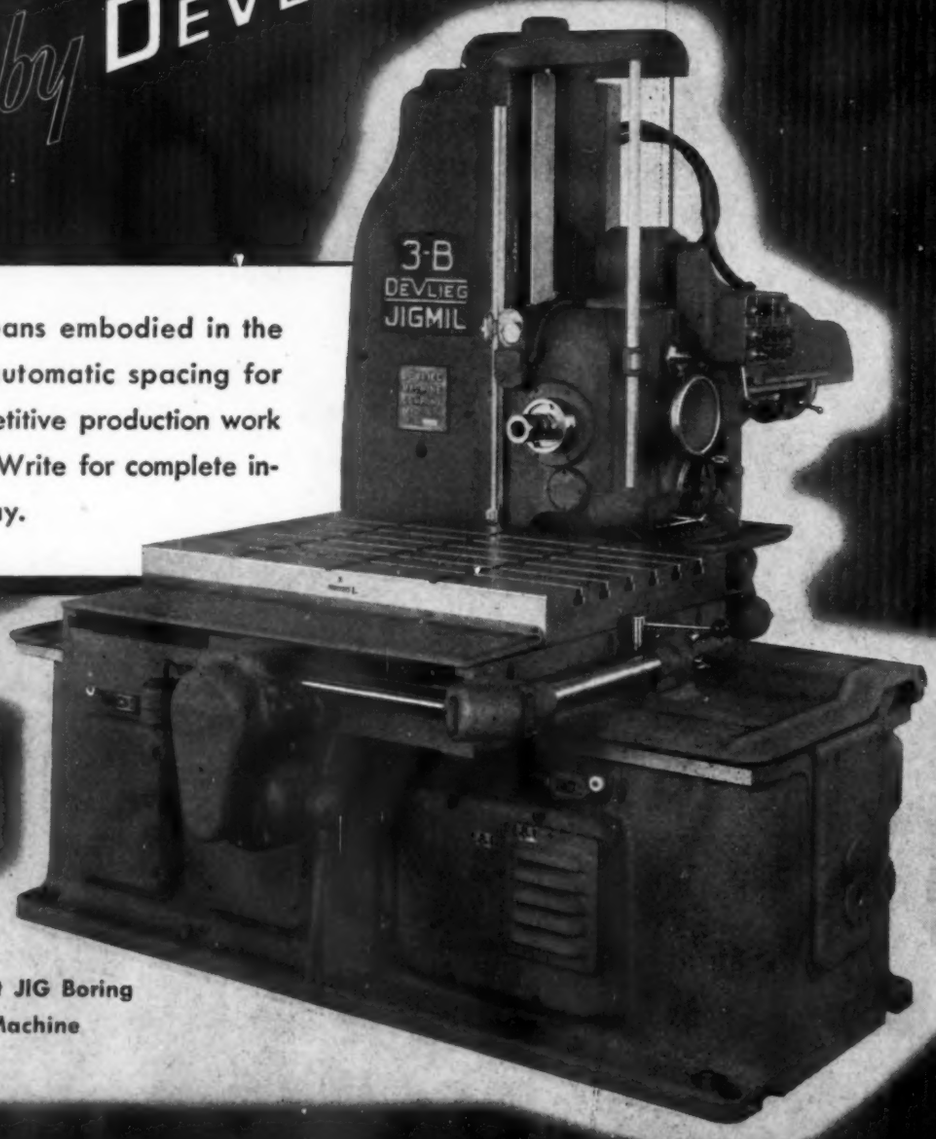


A duplex machine for milling locomotive rods, drive boxes, wedges, etc.

MACHINE CO., ROCKFORD, ILLINOIS

Announcing

DUPLITROL
by DeVLIEG



● A new means embodied in the JIGMIL for automatic spacing for duplicate repetitive production work without JIGS. Write for complete information today.

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It is reported that . . . . . .

Ralph C. Coxhead Corp. of New York has a new Vari-Typer that uses 600 styles and sizes of type, plus foreign language, chemical, mathematical and other symbols.

get ready with CONE for tomorrow

Patent 2,409,181 covers a sectional motor truck that can be separated into three pieces and carried anywhere by air.

be ready with CONE for today

Stromberg-Carlson has a new inexpensive adaptor that will enable most owners of pre-war FM sets to receive broadcasts on the new band.

get ready with CONE for tomorrow

Frigidaire, Division of General Motors, is making a plastic lid for its ice cream cabinets that is claimed to be 50% lighter than steel.

be ready with CONE for today

New England Carbide Tool Co. is taking tungsten carbide to the housewife in its new precision knife sharpener.

get ready with CONE for tomorrow

The State of Minnesota will go into business with Continental Machines, Inc. to engage in a continuous chemical process for the extraction of pure iron from slate formerly wasted at the Mesabi iron range.

be ready with CONE for today

The New Holland Machine Co. of New Holland, Pa., will test its new flame cultivator on truck and garden crops in the Rio Grande Valley this winter.

get ready with CONE for tomorrow

Bell System's first experimental rural radio-telephone circuit connects 8 Colorado farms with the Cheyenne Wells central office. Wind driven generators supply power.

The four largest alternating current motors ever built, 65,000 horsepower each, will be made by Westinghouse for Grand Coulee.

be ready with CONE for today

Lockheed's Little Dipper light plane is reported to cruise at 100 m.p.h. and land at 20.

get ready with CONE for tomorrow

A mobile alcohol plant built into a five car train that could travel from farm to farm was demonstrated at the National Chemical Exposition.

be ready with CONE for today

Phthalic anhydricle, one of the most important ingredients in the manufacture of paints, is now being made from petroleum by Oronite Chemical Company.

Climax Molybdenum Corp. is working on two new high temperature alloys. One has 60% chromium, 25% molybdenum and 15% iron. The other has 60% chromium, 15% molybdenum and 25% iron.

get ready with CONE for tomorrow

The Gyro-Glider developed at the General Electric Flight Test Center has a rotor instead of wings and weighs 120 pounds, ready to fly.

be ready with CONE for today

M. W. Kellogg Co. has a new process for separating a considerable number of useful substances from fish and vegetable oils using liquefied propane at high pressure.

get ready with CONE for tomorrow

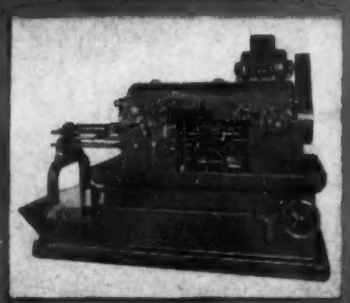
The Texas Company's new cold weather aircraft fuel is claimed to start an engine and to permit switching to regular aircraft gasoline in two minutes, in spite of extremely low temperatures.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

MORE facility is MORE value

The ⅜" 4-Spindle Conomatic, ordinarily assigned to rugged jobs, produced the brass pieces shown in 6 seconds each, including tapping.

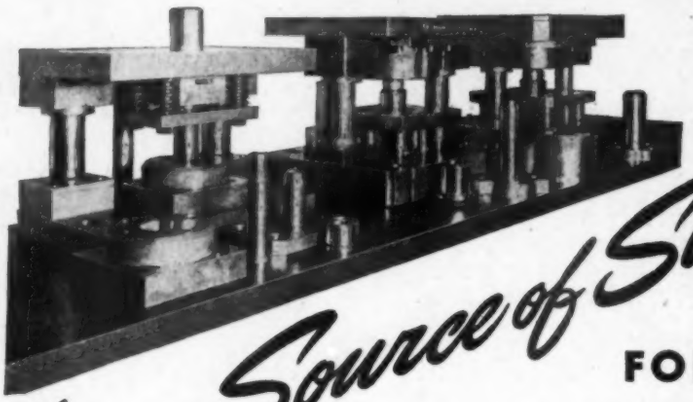
Ask your CONE representative to show you our new color motion picture



CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

38



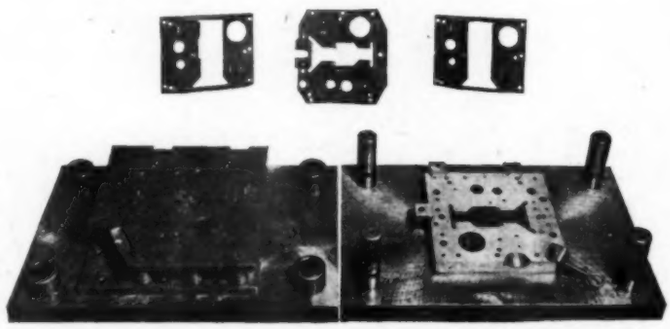
A set of draw dies for a cup . . . a typical job by skilled die makers.

Your Source of Supply FOR TOOLS DIES . . . JIGS *and* FIXTURES

ATLAS, with its 250 skilled Engineers, Designers and Toolmakers offers an unusually complete service to every field of industry.

We have one of the best equipped sections in the country with tool and die makers experienced in exceptionally close tolerance work. Everything from a simple die to an entire and complex tooling program will be handled with efficiency and dispatch.

Promise dates are set . . . and kept . . . with clock-work regularity. Send us your blueprints or an outline of your problems for specific recommendations.

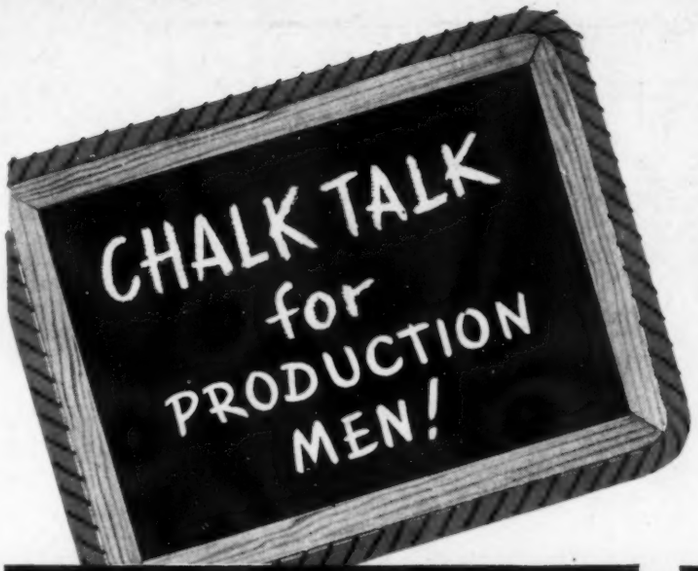


One of the hundreds of Piercing and Blanking dies accurately made by Atlas die makers.

ATLAS METAL STAMPING CO.

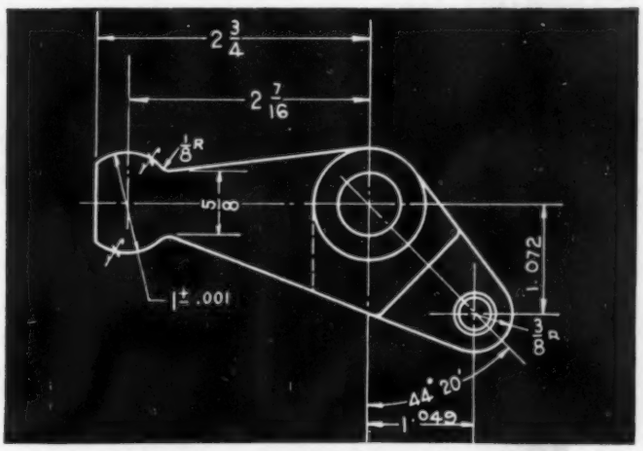
CASTOR AND KENSINGTON AVES., PHILADELPHIA 24, PA.

This service . . . second to none . . . is described and pictured in our Brochure "A Load off Your Shoulders onto Ours". Copy on request.

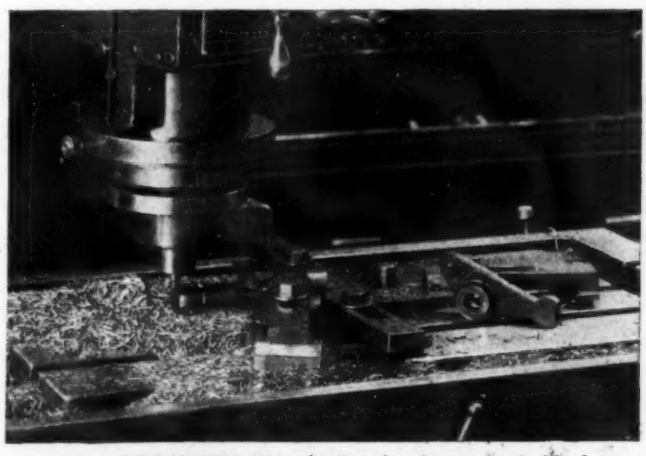


Cut Milling Time on this small part from 3¼ Minutes to 30 Seconds

1 **FAST!** The 1" dia. on the cam end of these malleable iron shifter levers was completely milled (ruff & finish) in 30 sec. each, floor to floor. Initial set-up took only 20 min. Old method of form milling took 3¼ min. Time saved is typical of Model 2D Rotary Head Milling Machine performance.



2 **DIRECT!** The simple radius of the cam end of the shifter lever was milled direct. A small end mill was the only tool used. Blueprint was the only guide operator had or needed. Precise mechanical control of the cutter in all angular and radial movements, a unique feature of the machine, did the rest.



3 **ACCURATE!** The single, simple set-up held chance for error to minimum. The built-in precision control and measuring devices for all combinations of cutting movements, angular and radial in both horizontal and vertical planes guaranteed uniform, accurate results.

4 For more facts on how you can get FAST, DIRECT, ACCURATE results on other contour milling jobs, or on tool and die work, using the Kearney & Trecker Rotary Head Method, write for bulletin 1002C on the Model 2D Rotary Head Milling Machine.

KEARNEY & TRECKER CORPORATION
MILWAUKEE 14, WISCONSIN 4719

GET THE FACTS

ON *American's* UNIVERSAL BROACHING MACHINE

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MACHINE
CIRCULAR
NUMBER 100
American 3-way vertical hydraulic broaching machines are general purpose machines adaptable to many different operations, including surface broaching as well as push down and pull down internal operations. Easily operated, highly productive, and flexible in its applications. Sizes range from 4 to 8 tons with 24" stroke and 6 to 15 tons with 36" stroke.
AMERICAN BROACH & MACHINE COMPANY
A DIVISION OF
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BROACHING MACHINES

A NEW CIRCULAR, just off the press, tells the story of *American's* highly flexible 3-way Broaching Machine. Shown in detail are the various kinds of work it performs, including surface broaching, and push down or pull down internal broaching. *American* 3-way Vertical Hydraulic Broaching Machines combine the advantages of fast, easy operation with the ability to maintain a high rate of accurate production. A letter or post card will bring the new circular by return mail. Write today. Ask for Circular Number 100.

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COMPACT MOTOR-DRIVE CONVERTS EXISTING KRW PRESSES TO HIGH PRODUCTION UNITS AT LOW COST SIMPLE TO INSTALL *Immediate Delivery*

● Already, a great many owners of KRW Hand-Operated Presses have converted these presses to regular production units by equipping them with the new KRW Motor-Drive. These units . . . either air-oil or motor-driven . . . are available for 25, 50, 60 and 75-ton KRW standard presses. When power equipped, and utilizing simple, inexpensive dies, these standard presses are adaptable to a great many bending, forming, stamping and straightening operations . . . relieving heavier and more expensive equipment for other work. The Motor-Drive is easily attached to the press. Adding the unit in no wise affects the famous KRW two-speed hand pumping feature . . . press can still be hand-operated. Give us serial number of your KRW press and electric current requirements and we will quote you price and quick-delivery date. Put your idle or infrequently used KRW hand-operated Arbor Presses to work where they will pay big dividends . . . on your production line.

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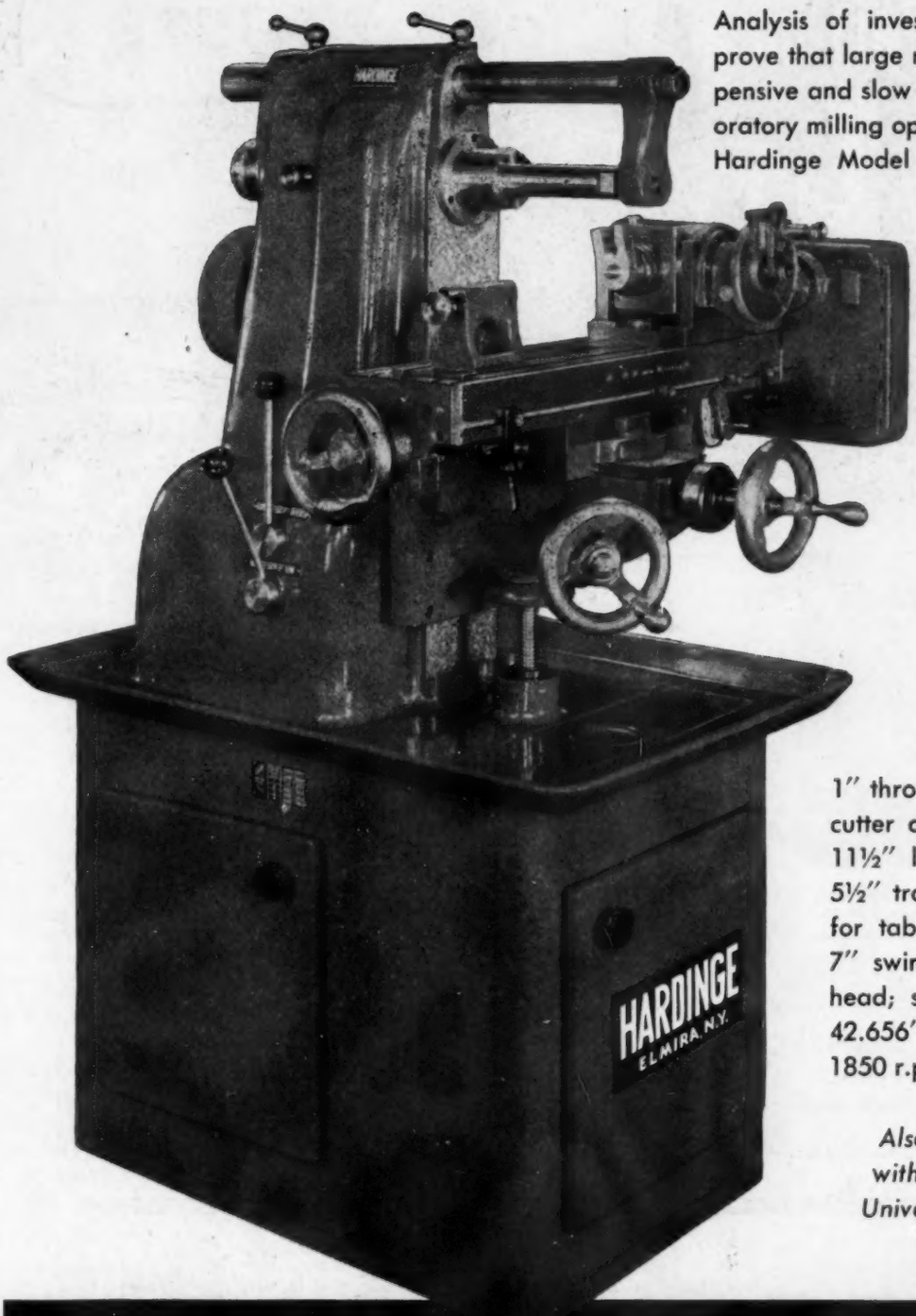
DROP-FORGINGS AND DROP-FORGED TOOLS

HARDINGE
ELMIRA, N.Y.

High Speed Precision *Universal* Milling Machine

for Profitable Tool Room and Laboratory Milling



Analysis of investment and time costs will prove that large milling machines are too expensive and slow for most tool room and laboratory milling operations.

Hardinge Model UM High Speed Precision Universal Milling Machines are designed to meet the definite need of tool room and laboratory for precision, ruggedness, extreme accuracy and ease of operation.

Specifications

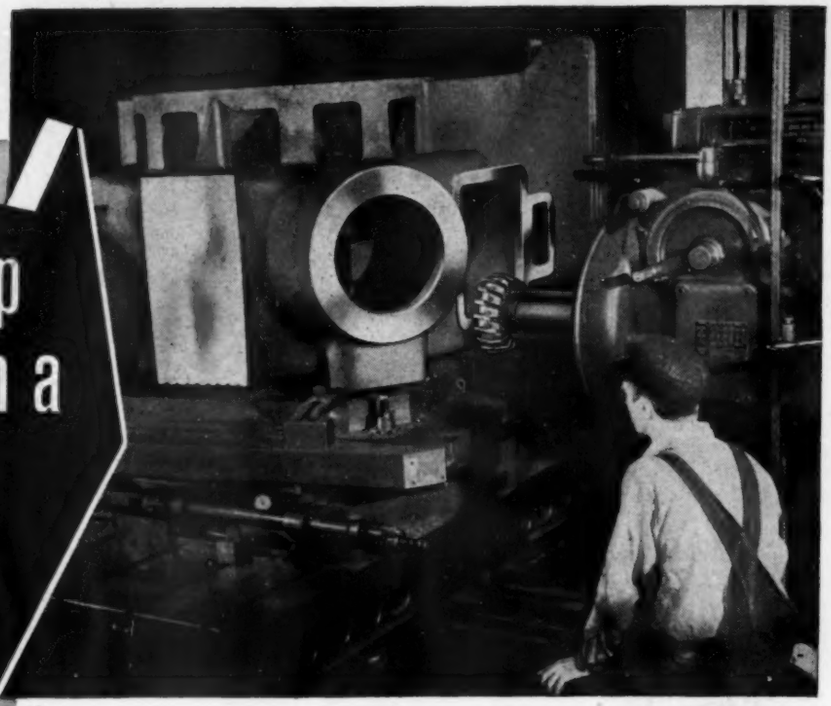
1" through collet capacity for both cutter and dividing head spindles; 11½" longitudinal, 13¼" vertical, 5½" transverse travel; power feed for table ⅛" to 13" per minute; 7" swing universal spiral dividing head; spiral leads from .600" to 42.656"; eight speeds from 110 to 1850 r.p.m.

Also available in TM Model with non-swiveling table and Universal Plain Dividing Head.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

Large compressor crankcase placed on a rotary table to speed overall machining time on a G. & L. machine.



Quick Set-Up of this Part on a G & L

MAKES THIS JOB PROFITABLE

Outline drawing of compressor crankcase showing different index stations. Heavy lines indicate finish surfaces.

Machine Equipped With Rotary Table Simplifies Difficult Work Handling . . . Indexing Presents All Surfaces for Precision Machining

Only one work setting is required to machine six different surfaces of this large casting. Use of a hand operated rotary table on a Giddings & Lewis machine makes it possible to index the work without unclamping, relocating and reclamping for each operation. This procedure increases overall machining accuracy and profitably cuts handling time.

After the initial setup is made on this part, each subsequent casting is placed on the rotary table and is ready for machining in approximately 15 to 20 minutes. Overall machining time varies from 6½ to 7 hours depending upon the condition of the casting.

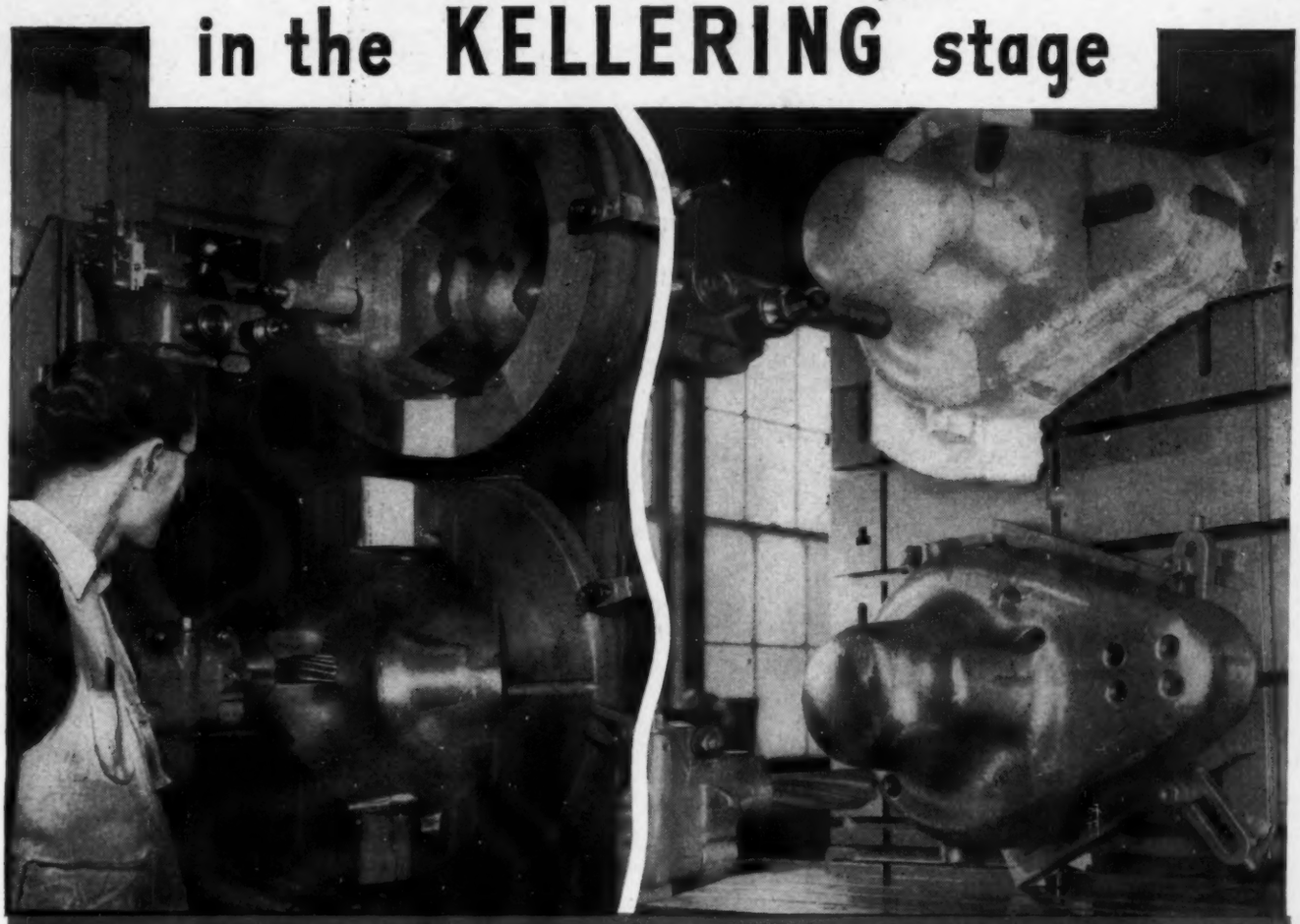
Similar speed-ups in handling your own work may be easily effected by using time-saving accessories and attachments on your Giddings & Lewis horizontal boring, drilling and milling machine. Ask G. & L. engineers.

SEQUENCE OF MACHINING OPERATIONS

1. Mill base—Index Rotary Table.
2. Mill first flange for cover plate opening—Index Rotary Table.
3. Mill first 19" cylinder connecting surface—Index Rotary Table.
4. Mill 12¼" pad—Index Rotary Table.
5. Mill second 19" cylinder connecting surface—Index Rotary Table.
6. Mill second flange for cover plate opening—Index Rotary Table.
7. Bore, rough and semi-finish second 12.750" cylinder opening—Index Rotary Table.
8. Bore, rough, semi-finish, finish and chamfer first 12.750" cylinder opening—Index Rotary Table.
9. Bore, finish and chamfer second 12.750" cylinder opening.

Giddings & Lewis MACHINE TOOL CO.
138 DOTY ST. • FOND DU LAC, WIS.

Meet your new POWER lawn mower in the KELLERING stage



Finished, except for final polishing, is the "female" half of a mold for an aluminum power lawn mower housing, ready for removal from the Keller. The scene is the shop of The Sterling Engineering Co., Winsted, Conn.

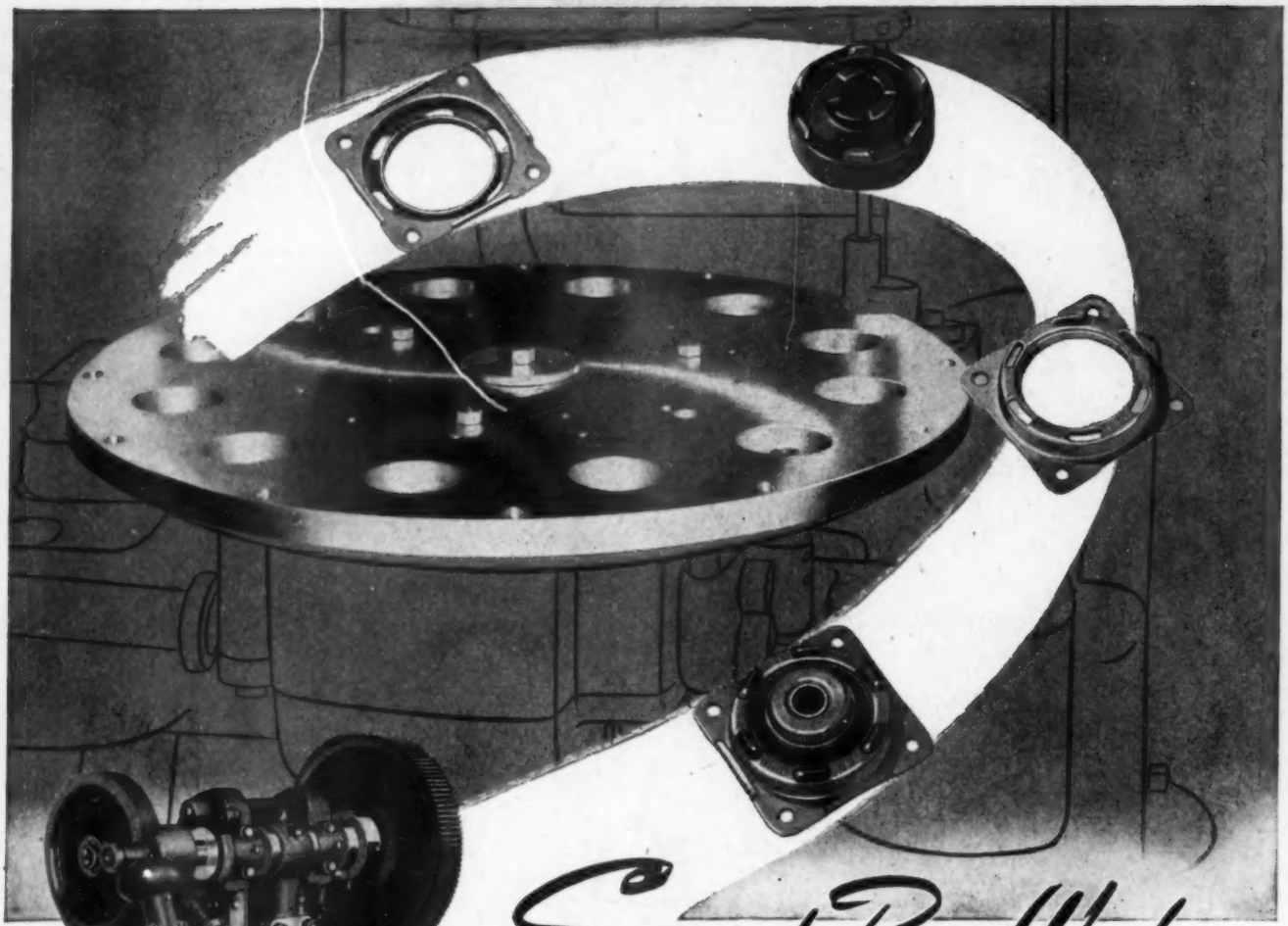
The "male" half of the lawn mower housing mold in production. Note the wood and plaster "master" at the top with the tracer feeling out the design and the tool below duplicating every detail in metal.

Let the green grass grow — who cares? Your new power lawn mower is on the way. You see it taking form in these pictures as Keller Machines cut the male and female cavities of a large mold for the aluminum lawn mower housing.

Tracer-controlled milling or "Kellering" is the accepted modern method of creating dies and molds. The sensitive electrically controlled tracer feels out the most complicated details in the easily-made wood or plaster "master" and the following cutter duplicates them in tough steel. Fast, faithful and finished is the work of Keller Machines, whether they're big ones making car body dies or little ones making small dies, or parts for pilot models.

"Keller it" and watch mold-making time grow shorter, cost grow smaller, quality improve. Equip your own tool shop or patronize Keller-equipped shops. Write for details.

Pratt & Whitney
Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT



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Advanced design Federal Dial Feed Presses now produce scores of special items which formerly required special machinery of limited utility—and increase production as much as 3 to 6 times besides! Dials are easily indexed to any part of the crankshaft revolution, from 90 to 120 degrees, giving long or short dwell of the dial. Positive-locking mechanism smooths out the dial action (cannot skip or coast by stations)—permitting unusually high speed with exceptional accuracy, and assuring additional safety for the operator. On some jobs, automatic loading and ejecting mechanisms can be used to increase speed 4 or 5 times over hand operations. Equally important, Federal Presses are ruggedly built to stand up under hardest usage and give years of continuous service. Write for catalog of complete Federal Press line.

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AVAILABLE IN 8 SIZES—CAPACITY, 6 TO 80 TONS

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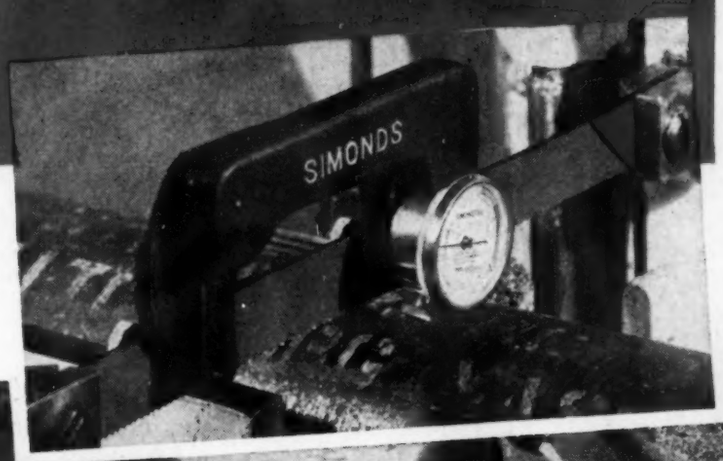
to make sure all users get Smoother Cutting and Longer Life from all

"RED END" Hacksaw Blades



1. New Educational Motion Picture. Designed to take a new operator through the various steps in the proper use of both hand and power-machine hacksaw blades. It helps him select the right blade for different cutting jobs and the correct methods of operation in order to get greatest efficiency and longest blade life.

This 16 mm. film, with color and sound, will be interesting and helpful to experienced operators also, because it actually shows how hacksaws cut. And it explains the new technique of hacksaw tensioning which has helped many plants to get greater cutting efficiency. Showings may be arranged through the nearest Simonds office.

2. "SIMOMETER" Eliminates Guesswork in Hacksaw Tensioning. This new device saves costs by eliminating guesswork when tensioning blades. Attached directly to any blade, the "SIMOMETER" avoids inaccuracies due to friction of blade holder, or to varying thread pitches of tightening devices. Ask your Industrial Supply Distributor for a demonstration.

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The machine shown is one of a line of five Transfer-matics which Cross created for machining and advancing 1400-pound railroad car axles automatically through a programmed sequence of operations. Here journals and wheel seats, at each end, are turned simultaneously. Loading, clamping, turning, unloading, and the transfer from operation to operation are all done by power and included in the cycle. Machining operations, immediately preceding, are cut-off, crop, and center.

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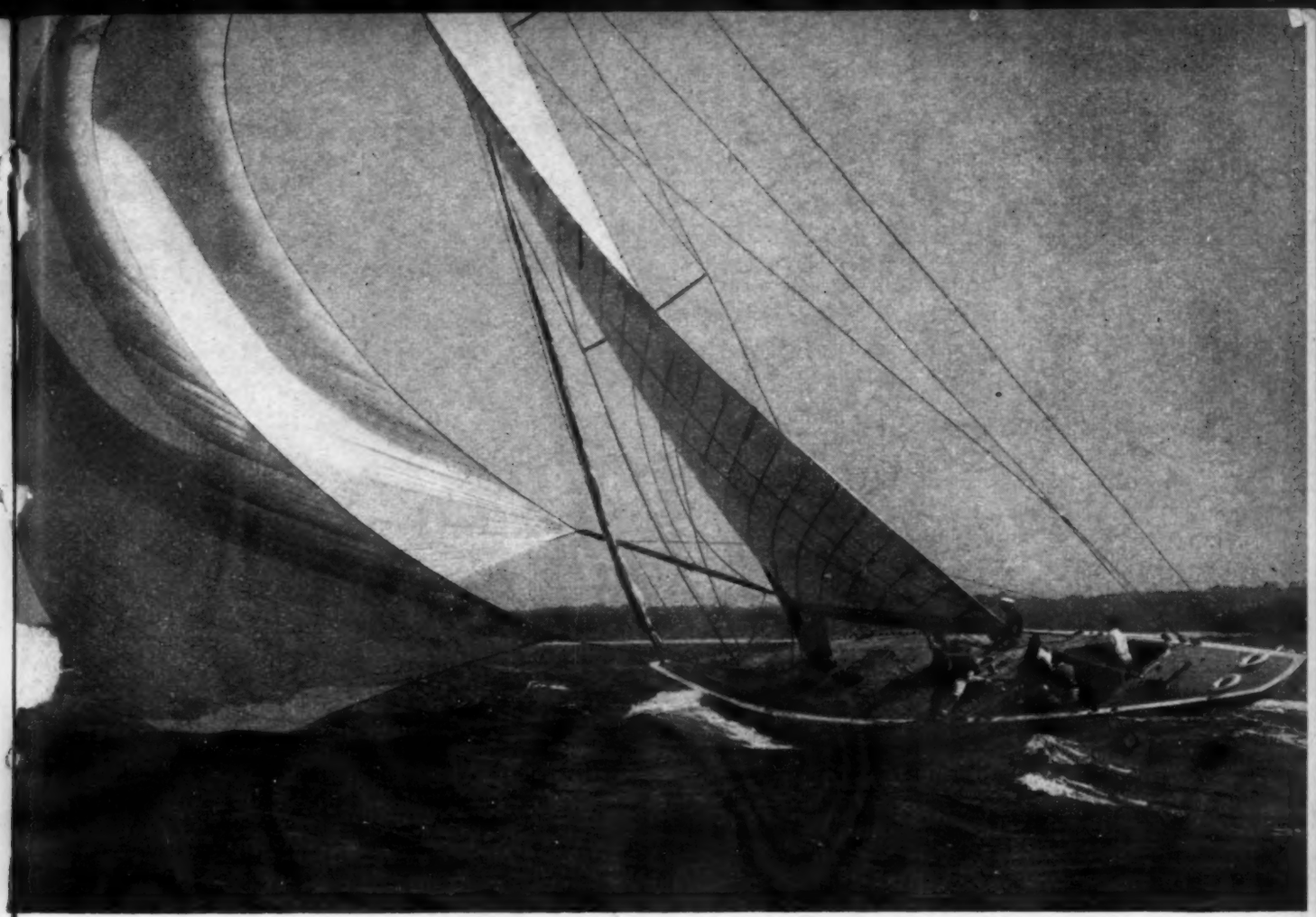

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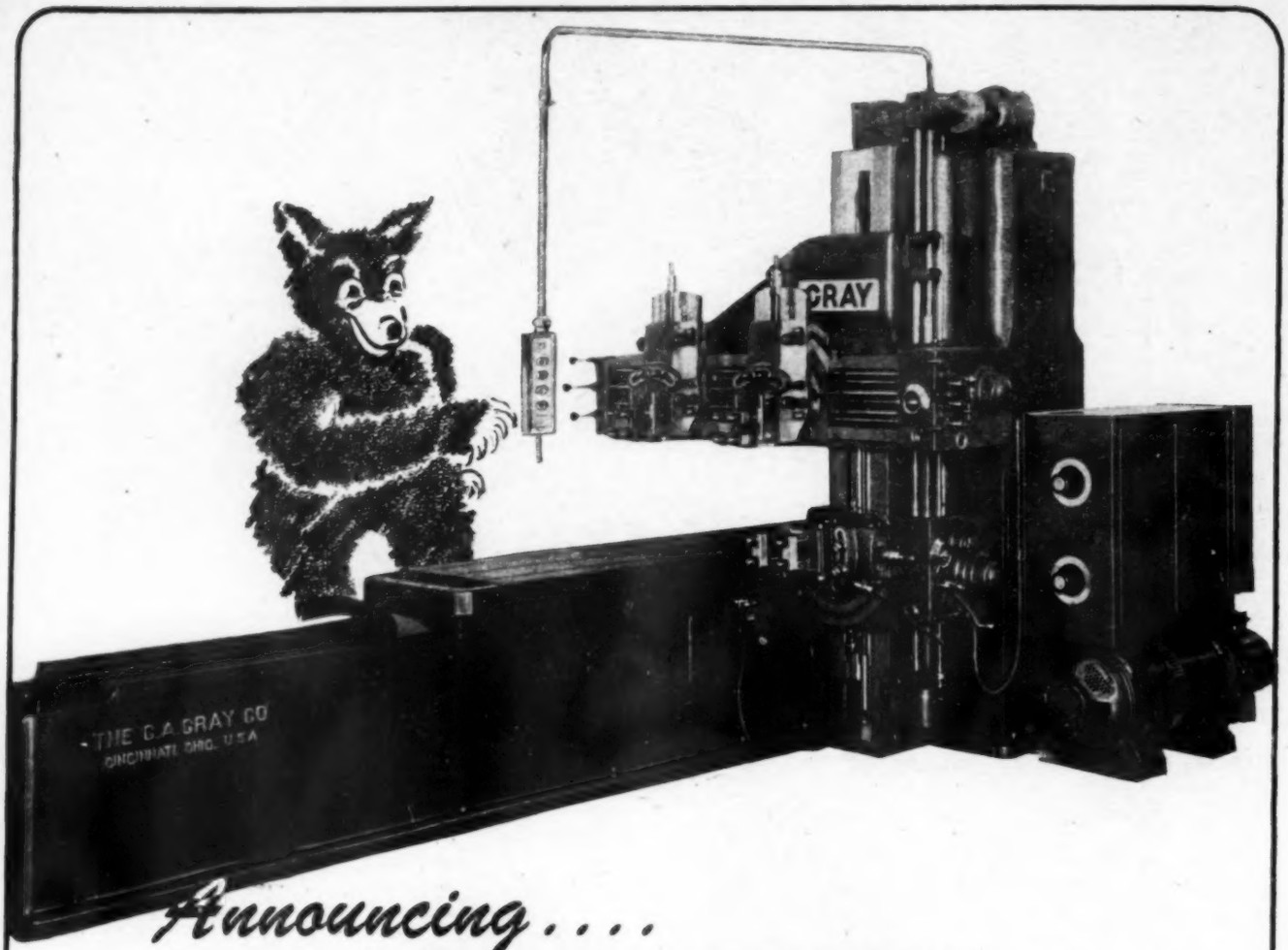

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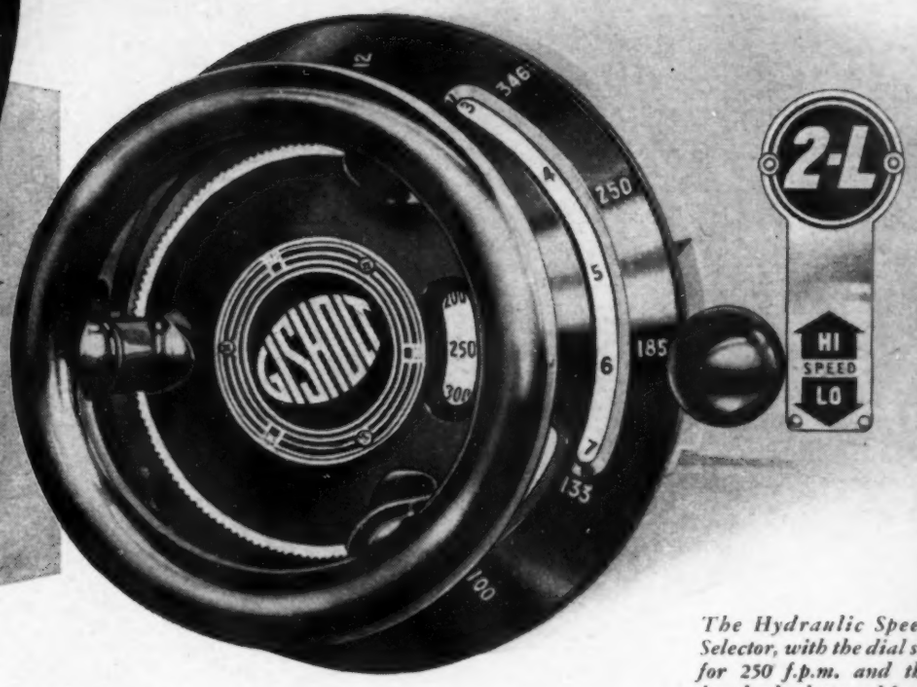

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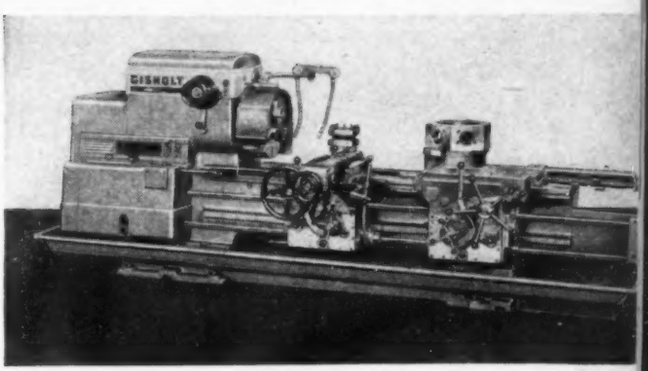

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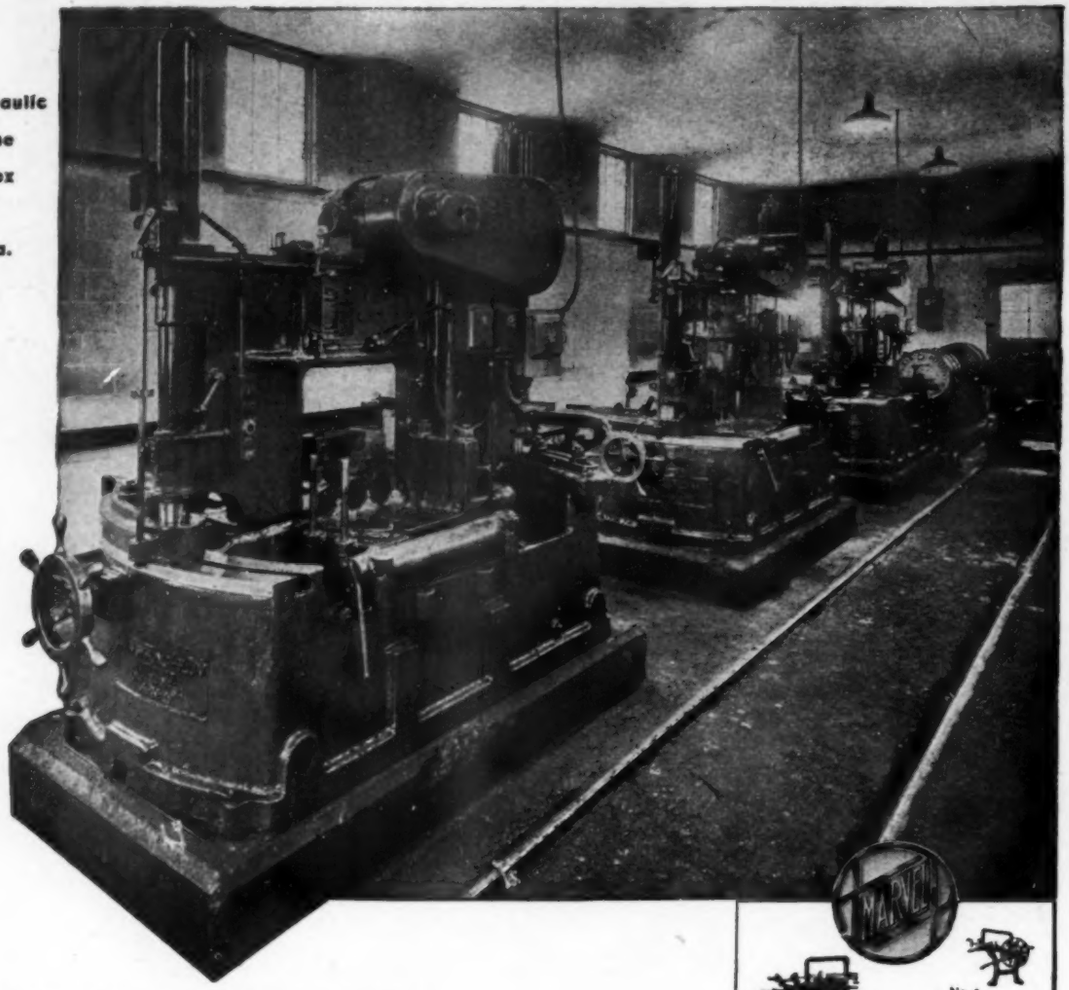
3 MARVEL #18 Hydraulic Hack Saws at the Babcock & Wilcox Tube Co.— Beaver Falls, Pa.



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Steels just don't come too tough for MARVEL Giant Hydraulic Hack Saws. Take, for example, the three No. 18 MARVEL Saws, at the Babcock & Wilcox steel mill, shown above. These machines are used to cut test specimens from sample pieces of stainless and other tough alloy billets which are checked for seams, pipes, etc., before being drawn into tubing. It takes tough steel to make the best tubing, and it takes modern sawing equipment to cut it rapidly, accurately and economically.

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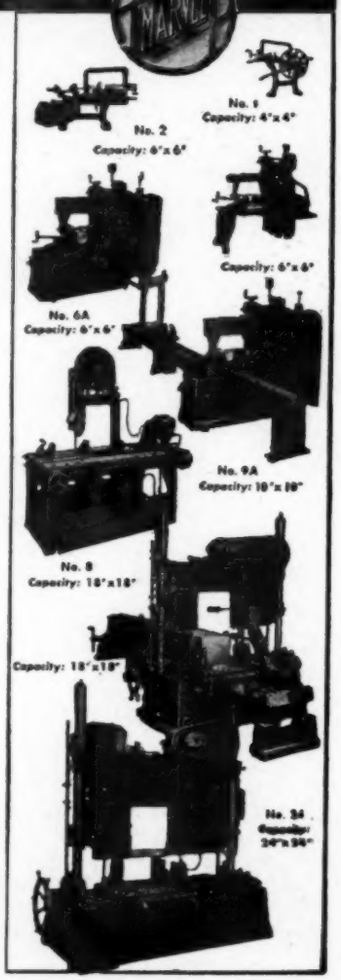

MARVEL SAWS

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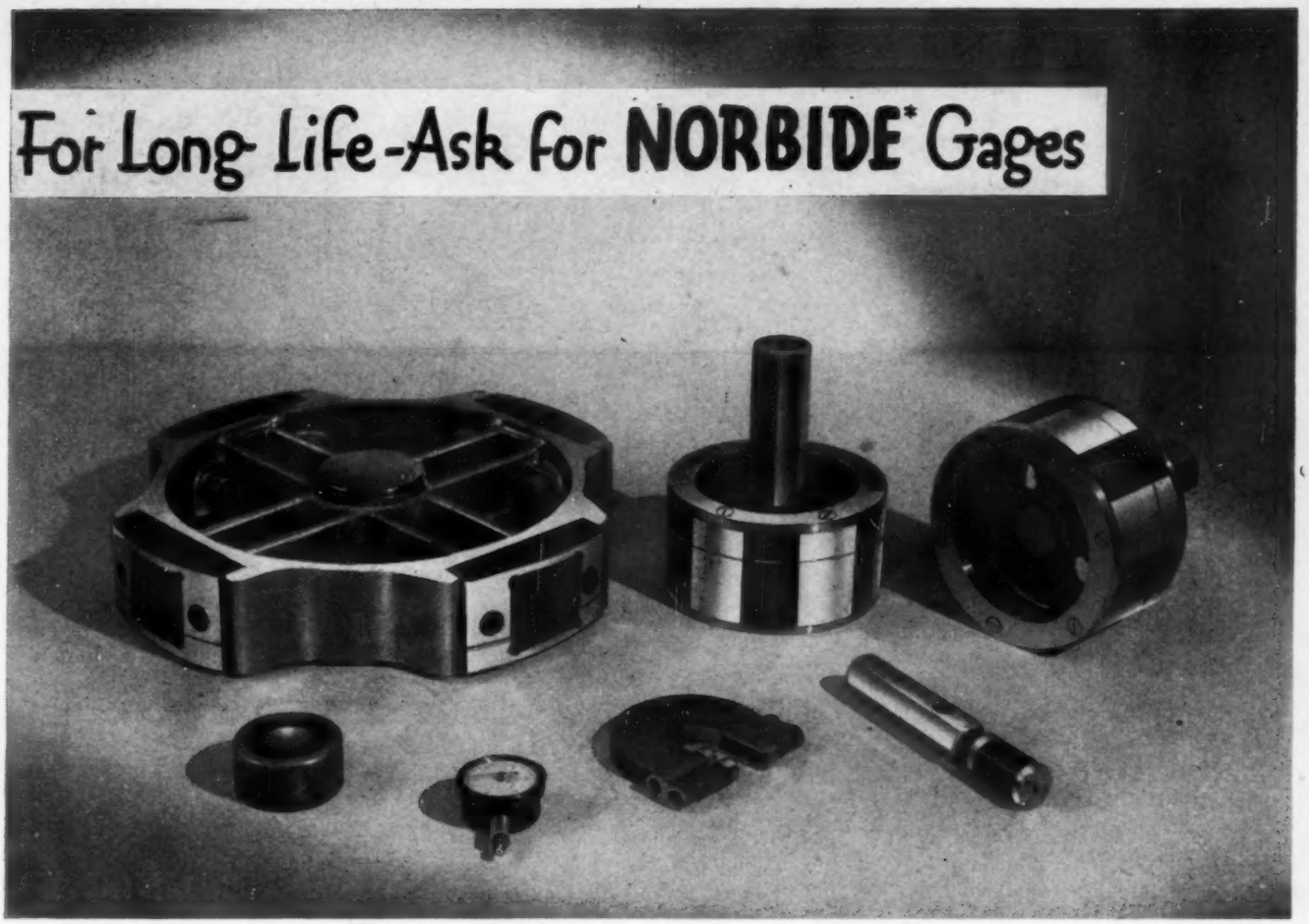

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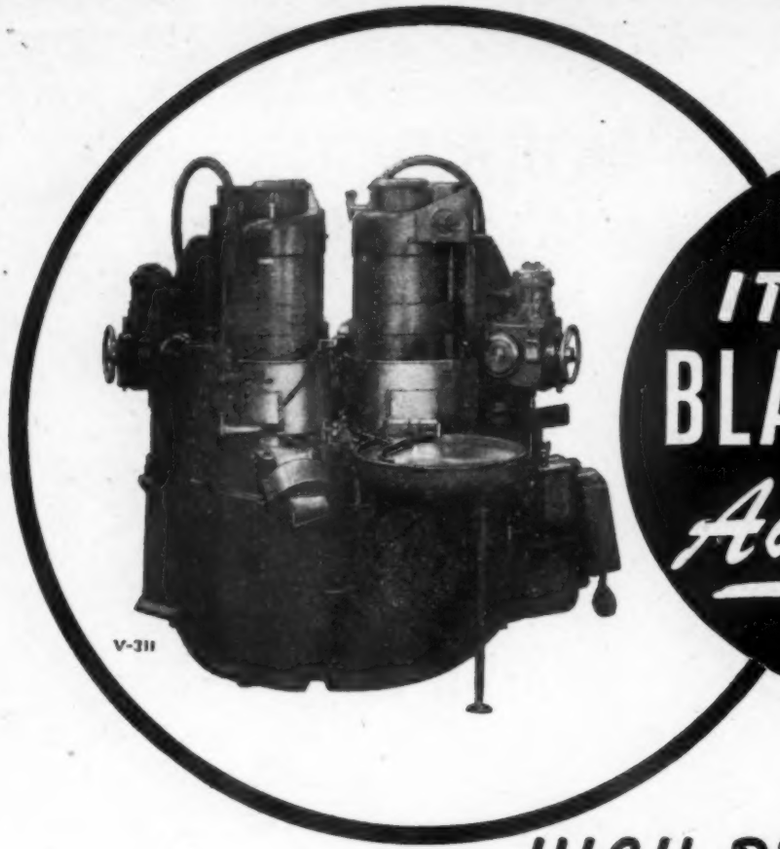
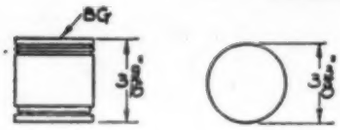


PUT IT ON THE BLANCHARD *Automatic*



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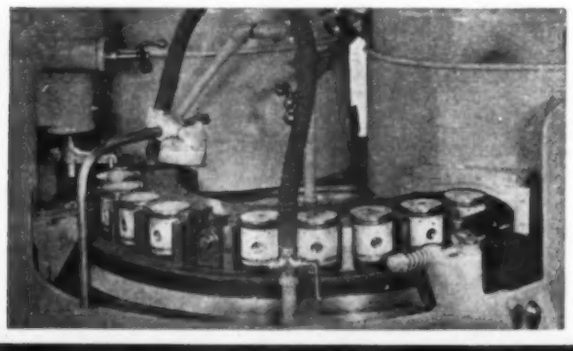
On this job the Blanchard 16-A2 automatic surface grinder utilizes a 26 station rotating fixture. The pistons are located on studs which fit the piston pin holes. Squaring is done from the sides of vertical vees in which the pistons are held by a stationary spring loaded steel band.



Each grinding wheel is controlled by its own caliper so that a definite amount of stock is left by the first wheel for the finishing wheel to remove. The finishing wheel caliper controls the final size. This is all done with one pass under the wheels.

The Blanchard 16-A2 Automatic Surface Grinder is particularly suited to work requiring fine finish and close limits with high production.

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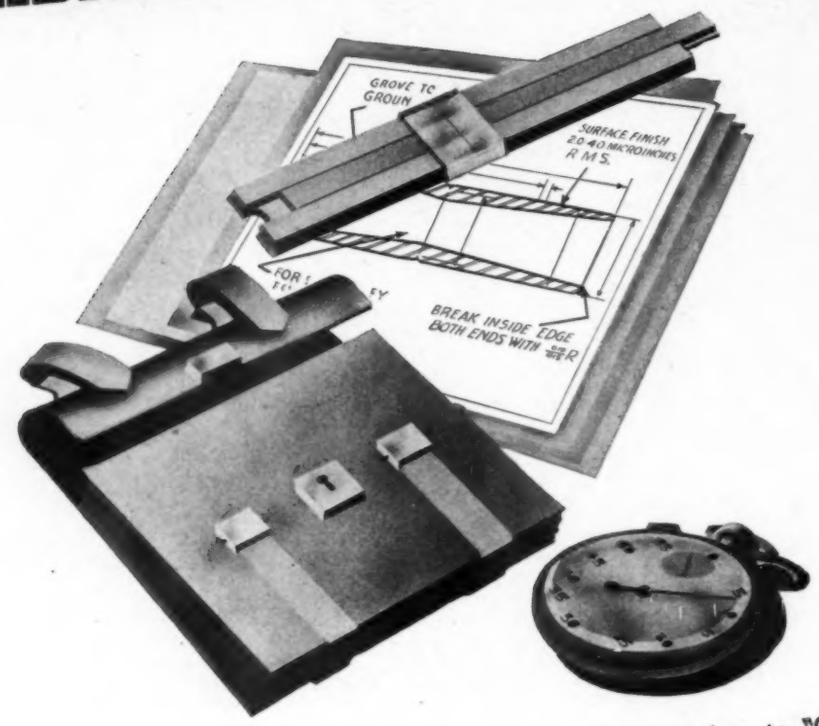

For an increasing number of abrasive users, the suggestion to "Call in CARBORUNDUM" is becoming a standard practice. In many cases, it means calling in our Abrasive Engineers to discuss specific abrasive applications.

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CARBORUNDUM

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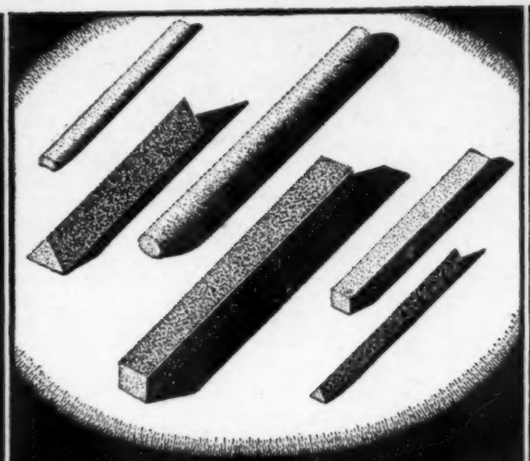
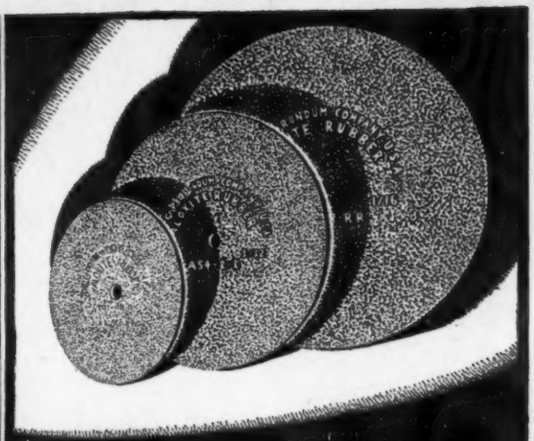


Tool Room sticks and stones that cut fast...last long...and hold their form.



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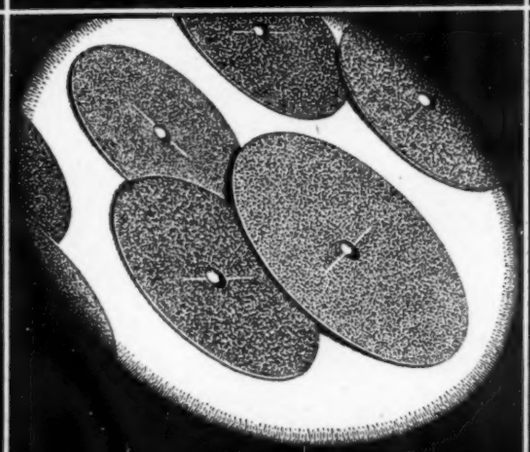

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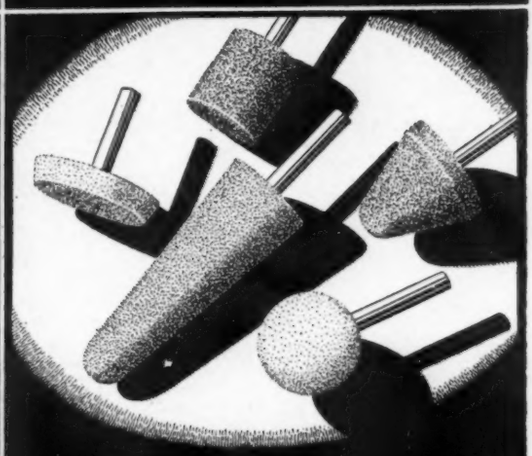

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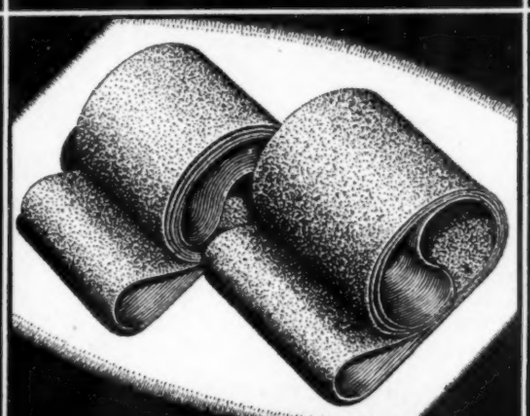

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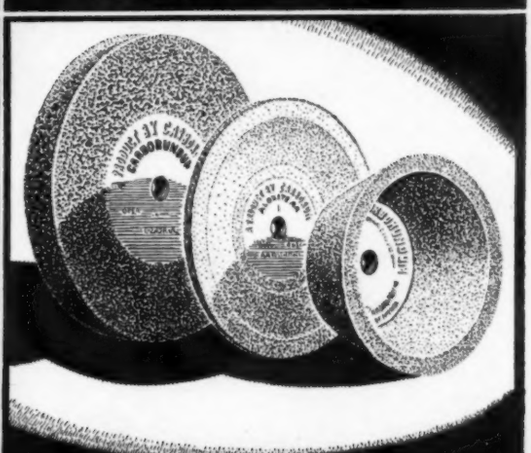

All standard shapes are supplied in grinding wheels by CARBORUNDUM.

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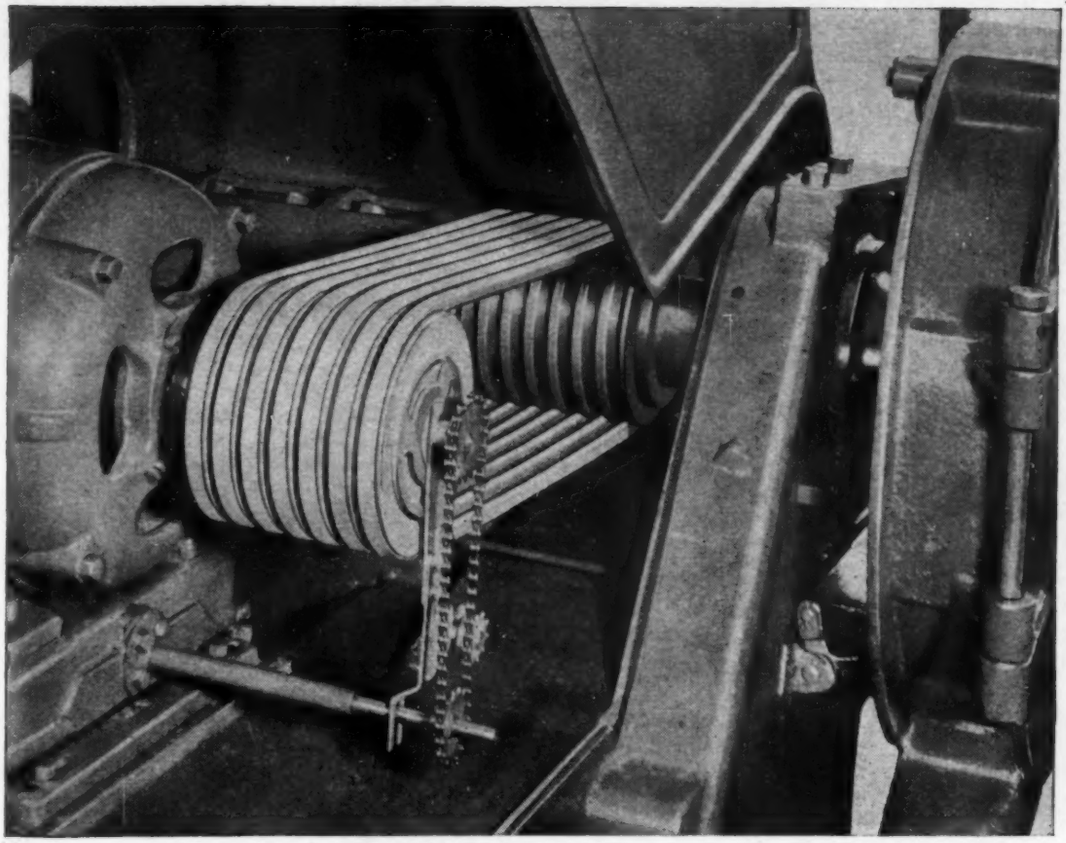

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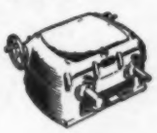
"Vari-Pitch" SHEAVES
Exact variations in speed, stationery or motion control.



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A CENTURY OF SERVICE
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THAT MADE
America Great

Welded Design Cuts Machine's Cost 60%

BY H. H. STAHL, DISTRICT MANAGER AND WELDING ENGINEER, THE LINCOLN ELECTRIC CO., BOSTON, MASS.

A striking example of a present-day trend in machine design is the evolution of a strawboard shear machine made by Hobbs Manufacturing Co., Worcester, Mass.

Redesign of this machine for fabrication by electric arc welding resulted in a machine with a weight of only one-third that of the original and costing 60% less to produce.

In the former design (see Fig. 1), the various parts of the shear were made in individual pieces and had to be hand-fitted, drilled and bolted. All of these operations were eliminated by the welded design (see Fig. 2), which utilizes rolled steel in standard angles and plate sizes.

THE DESIGN PROBLEM

In changing over the design to welded steel construction, the manufacturer analyzed the load requirements of the frame which consists essentially of four legs acting as columns and braces acting as beams. Resistance to deflection was the main consideration.

FIG. 1—OLD DESIGN. *This shear was made in individual pieces that had to be hand-fitted, drilled and bolted. Line production system was impossible.*

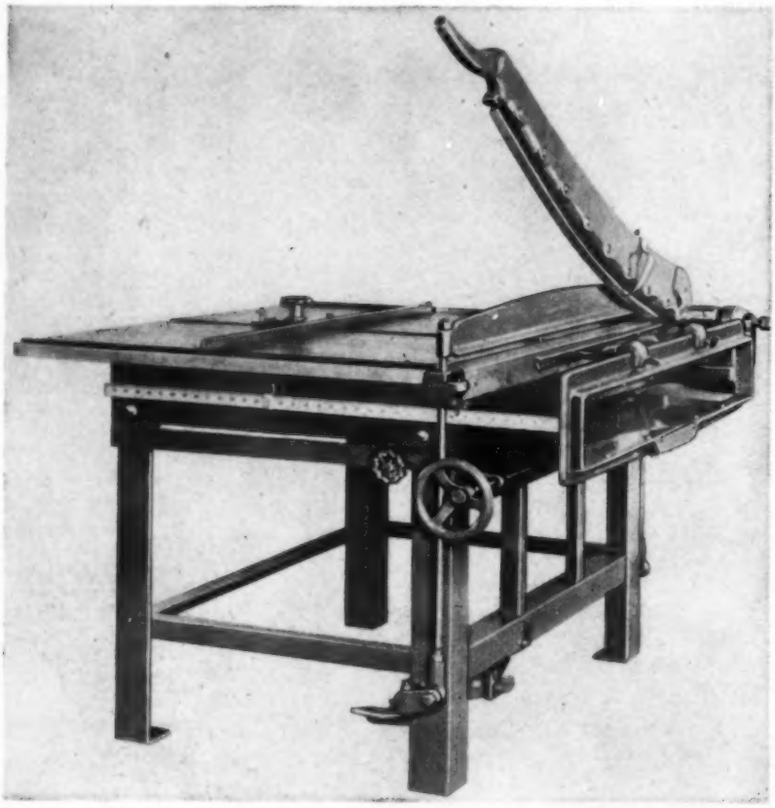


FIG. 2—WELDED DESIGN. *Hobbs engineers redesigned the shear for fabrication by arc welding. The new machine costs 60% less, weighs two-thirds less and is made by line production methods.*

For example, in studying the problem in light of the usual beam formula (see Page 496, 8th Edition, Lincoln Procedure Handbook), comparison can be made of the size of steel angles needed to replace the old material.

In simple designs such as this, however, the common sense formula, based on experience, should prevail. Sizes of members should be governed also by uncalculable demands of handling and shipment, when the machine often gets its roughest treatment.

PRODUCTION PROCEDURE

The simple angle iron and plate design of the frame (see Fig. 2) permits a standardized line production. Angles and plate are shear cut to size, are fitted up in a simple welded fixture and tack welded. All joints are fillets or square butts, requiring no bevelling. Tacked assembly is then placed in a positioner and finish welded . . . all joints downhand for maximum speed. A little grinding off of corner welds of top table and drilling for attachments is all the machining that's required.

A series of Studies in Machine Design are published by The Lincoln Electric Company and are available without charge to engineers and designers. They may be obtained by writing The Lincoln Electric Company, Dept. 212, Cleveland 1, Ohio.

PUT YOUR PRODUCTS in a *cleaning test tube*

When you bring your products to our demonstration laboratory we can show you exactly what type of cleaning machine is best suited to your cleaning problem and to the production volume you want to handle. Everything is here to give you the complete facts needed to compare your present practice, or any other cleaning method, with the results you can get with the world-famed airless Wheelabrator.

If you've been thinking about improving your cleaning practice and have been debating the pros and cons of various cleaning methods, here is a perfect opportunity to get positive facts. Hundreds of others like yourself have put the Wheelabrator to this test and it has proved, by convincing demonstration, why it is used in more plants than any other type of blast cleaning equipment. Let us arrange for such a test today.

American

WHEELABRATOR & EQUIPMENT CORP.

(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)

317 S. Byrkit St., Mishawaka, Indiana

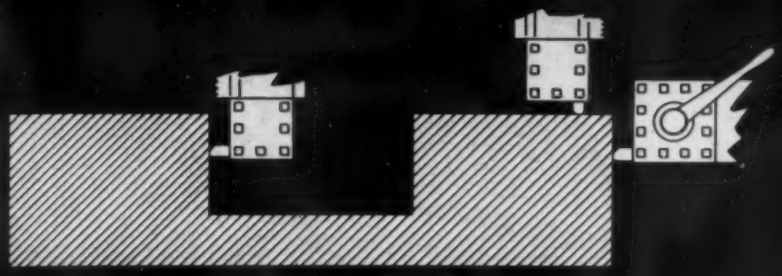
WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

Spindle Accuracy
with SKF Bearings

An easy turn of the handwheel on this No. 2 Motor Spindle Drilling Machine, and the operator can change spindle speeds and even shift back gears without stopping the machine. Sensitive enough to drill 1/16" holes in steel, yet with unusual power to take heavy cuts, and rugged enough to handle high speeds and feeds, this unit depends upon SKF Ball Bearings. These bearings are on the 15/16"-diameter spindles (from one to six, depending upon the model), and easily carry radial and thrust loads . . . assure spindle rigidity in smooth, quiet performance . . . require only occasional lubrication throughout a long, profitable life. For further information concerning the application of antifriction bearings to machine tool spindles, send for catalog, "SKF Machine Tool Spindle Bearings." 6222

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

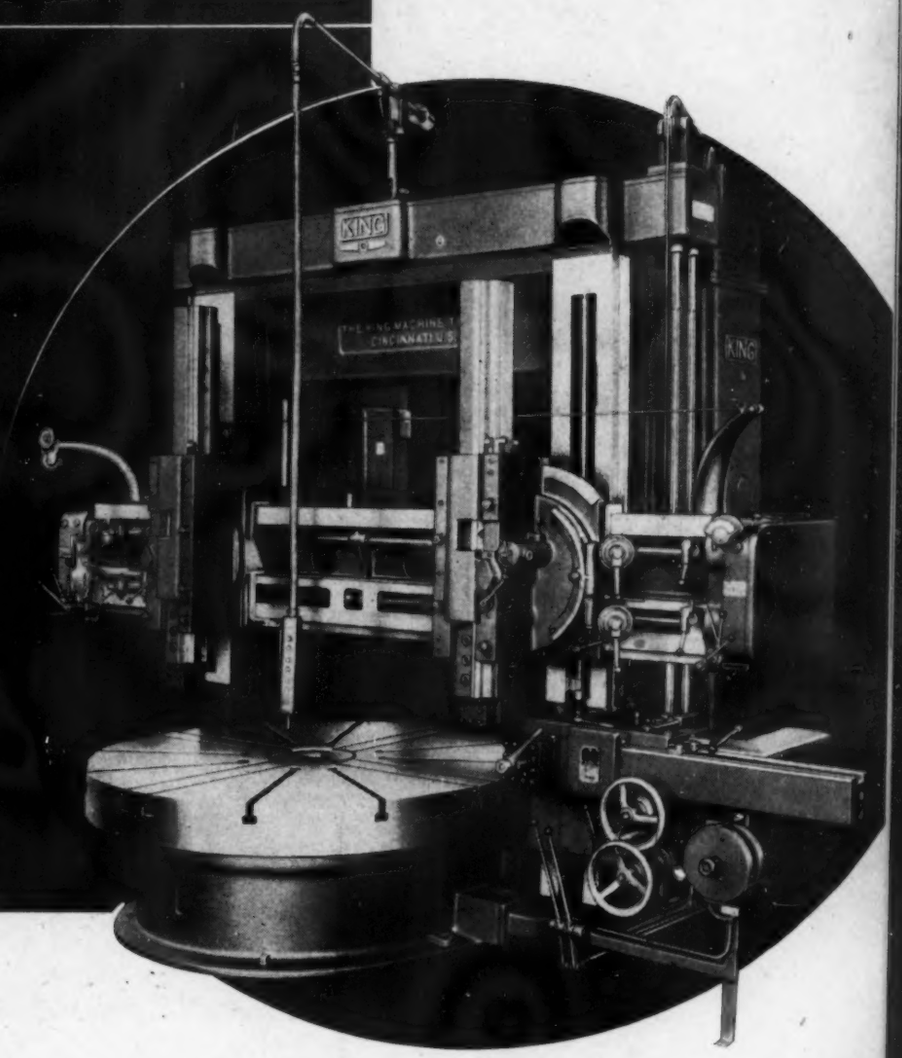
● *No. 2 Motor Spindle Drilling Machine built by Leland-Gifford Co. Maximum distance from spindle nose to table: 29". Vertical adjustment of head: 9".*



BORE FACE TURN

simultaneously on the New Series

KING



● Three operations at once is common practice on the New Series KING. This new machine is considerably heavier, with new rectangular type rams for added rigidity and precision.

Whether the job is a gray iron casting—steel forging—or non-ferrous material—this new series KING has the power—rigidity—and speed to produce more work—accurately—at lower costs.

Just watching one of these new KING machines in action will convince you that it has ample power to get the best results from carbide tools. Also that it is easy for the operator to make quick tool adjustments from his regular work position as all controls are at the front of the machine.

For longer service at lower maintenance cost —for adaptability to a wider range of operations investigate the new KING.

Available in ten sizes: Single Column; 30", 36", 42". Double Column; 52", 62", 72", 84", 100", 120", and 144".

THE KING MACHINE TOOL COMPANY

CINCINNATI 29, OHIO

Builders of Vertical Boring and Turning Machines Exclusively

Specify MO-MAX HIGH SPEED STEELS *for all of your* CUTTING *and* TURNING TOOLS

Because only MO-MAX GIVES YOU *ALL* THESE ADVANTAGES...

1. MO-MAX has superior cutting qualities.
2. The machinability of MO-MAX is unexcelled.
3. MO-MAX is economical. Its specific gravity is about 8% less than that of 18% tungsten steel.
4. MO-MAX is available in a standardized composition; also in cobalt and high vanadium varieties for special high speed steel requirements.
5. For 14 years MO-MAX has demonstrated its superiority in all types of cutting tools.

Learn all the facts! **Send for your copy of the MO-MAX Handbook, sixth edition. Get the full story about this remarkable steel, including easy-to-follow instructions on heat treating.**

THE CLEVELAND TWIST DRILL COMPANY

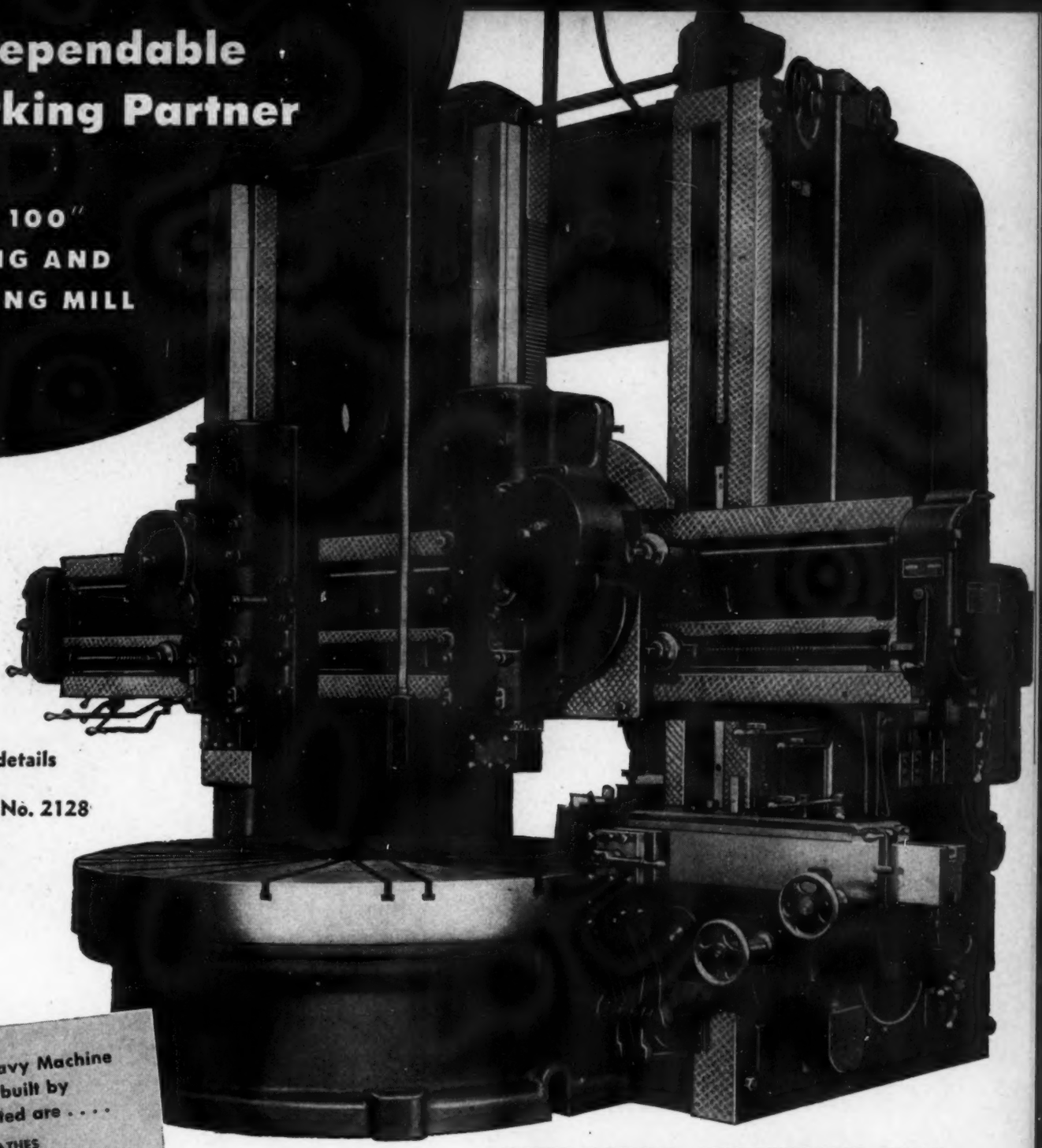
1244 East 49th Street • Cleveland 14, Ohio

Buyer's Guide to Brands of MO-MAX

"LMW"	Allegheny Ludlum Steel Corporation
"MOHICAN"	Atlas Steels Limited
"BETHLEHEM MM"	Bethlehem Steel Company
"MO-CUT"	Brenborn Alloy Steel Corporation
"STAR MAX"	Carpenter Steel Company
"MOLITE M-1"	Columbia Tool Steel Company
"REX T-MO"	Crucible Steel Company of America
"DI-MOL"	Henry Disston & Sons, Inc.
"HI-MO"	Firth-Sterling Steel Company
"REX T-MO"	Halcomb Steel Company
"MOGUL"	Jessop Steel Company
"YATMO"	Latrobe Electric Steel Company
"MIDMAX"	The Midvale Company
"S. T. M."	Simonds Saw & Steel Company
"MO-TUNG"	Universal-Cyclops Steel Corporation
"V-N-2"	Vanadium-Alloys Steel Company
"VUL-MO"	Vulcan Crucible Steel Company

A Dependable Working Partner

BETTS 100" BORING AND TURNING MILL



For full details send for Bulletin No. 2128

Among Heavy Machine Tools built by Consolidated are . . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER
SPECIAL MACHINES

BETTS BORING AND TURNING MILLS are built from 100" up to any requirement

As in all Betts machines, the accumulated experience of more than three-quarters of a century is built into this general purpose boring mill . . . another striking example of Consolidated's ability to combine accuracy and power with maximum productiveness.

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1861

BETTS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

PAST PERFORMANCE

...a safe guide for "The Tools You Buy Again"

Actual results — in terms of better, faster, more economical work—make standardization on UNION TOOLS a logical procedure and a sound policy. Years of specialization in development and manufacture has enabled UNION to produce long-lived, dependable small tools — toois that help keep production moving at maximum speed and accuracy at a minimum of expense.

Once you've put UNION tools to work, they'll be the "Tools You Buy Again." Performance will have been the basis for your choice.

UNION TWIST DRILL CO.
Athol, Mass.

STORES New York Store: 61 Reade St.; Los Angeles Store: 524 East Fourth St.; Chicago Store: 11 So. Clinton St.; Seattle Store: 568 First Ave., So.; San Francisco Store: 121 Second St.; Detroit Store: 5527 Woodward Ave.

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S. W. Card Mfg. Co., Div.; Mansfield, Mass.
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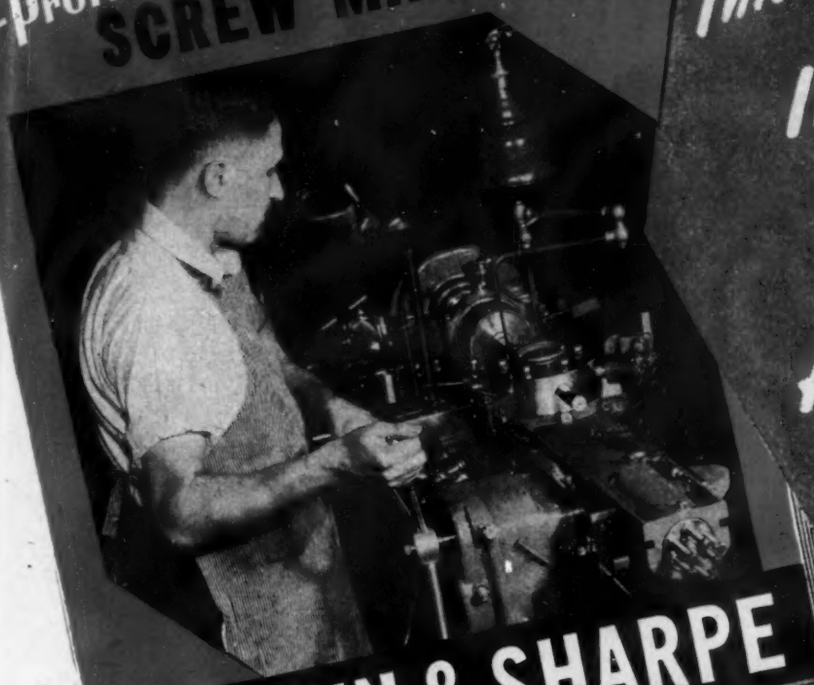
THE UNION LINE

Twist Drills — Milling Cutters — Reamers — Hobs — Slitting Saws — End Mills — Taps — Dies — Screw Plates—Profile Cutters.

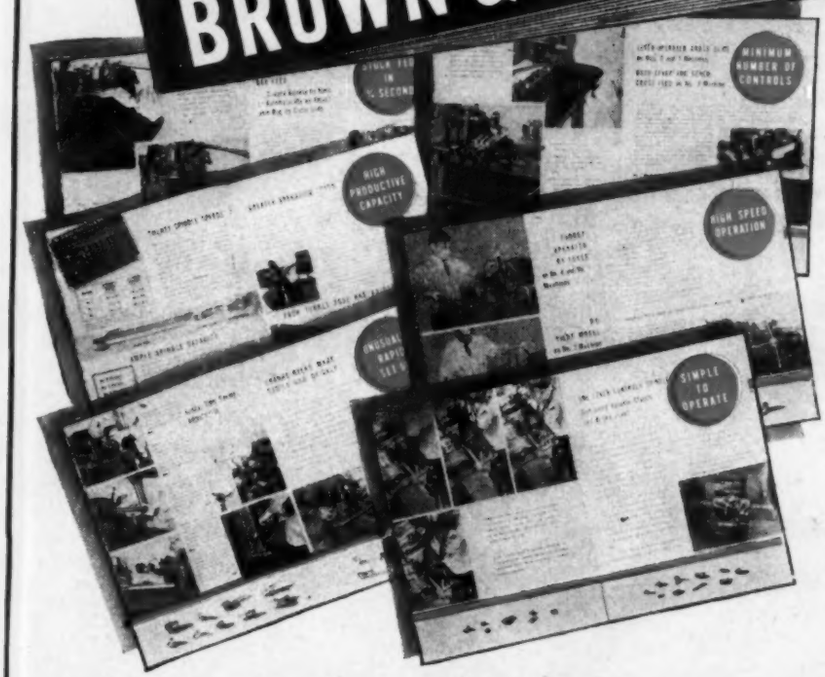
UNION

Modern Profitable WIRE FEED SCREW MACHINES



BROWN & SHARPE

This 32 Page book will show you IMPORTANT PRODUCTION ADVANTAGES



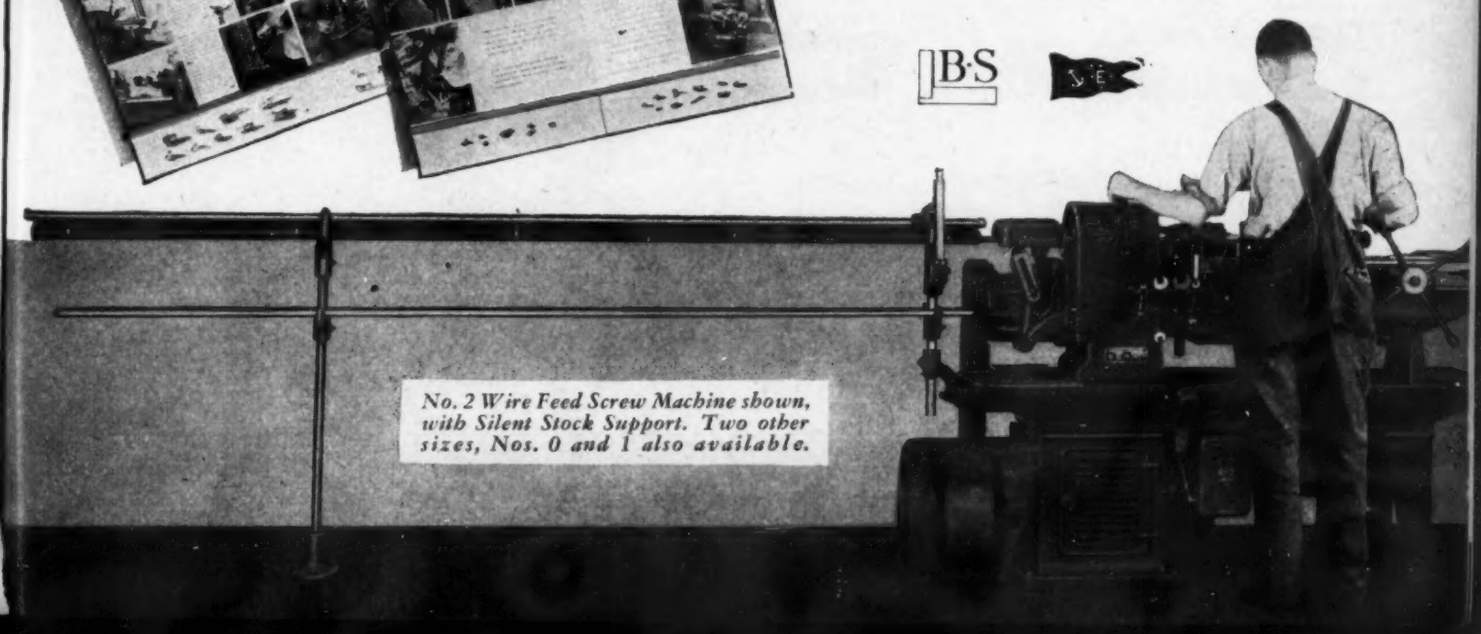
MINIMUM NUMBER OF CONTROLS — waste motion eliminated – operator fatigue reduced – efficiency raised.

SIMPLE TO OPERATE — full control of spindle movement concentrated in single lever – a definite aid to production.

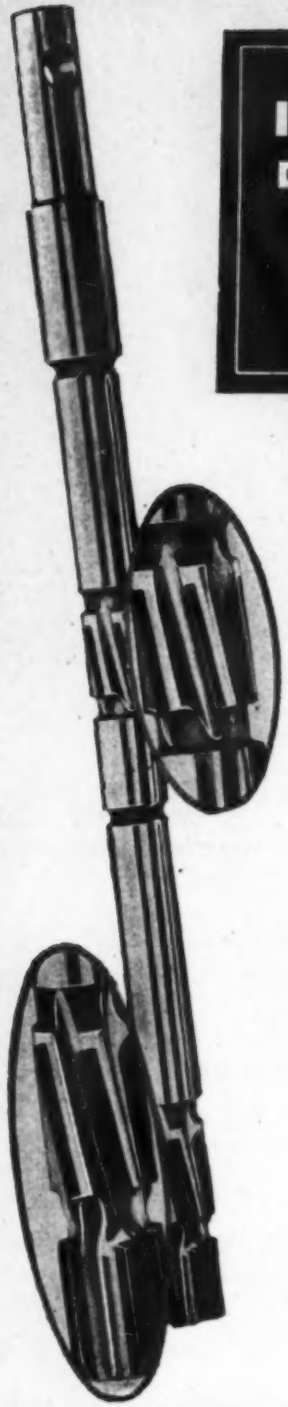
UNUSUALLY RAPID SET-UP — changeovers made quickly – doubly important for short-run or second operation work.

HIGH PRODUCTIVE CAPACITY — obtained by simplified controls, rapid set-up, wide speed range and ample power. Write for copy of this book on Wire Feed Screw Machines. *Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.*

B·S



No. 2 Wire Feed Screw Machine shown, with Silent Stock Support. Two other sizes, Nos. 0 and 1 also available.



INCREASE *Production*...
DECREASE UNNECESSARY HEADACHES BY ORDERING CARBIDE-TIPPED TOOLS *with* HIGH-SPEED STEEL BODIES

The most efficient tools are brazed with carbide tips on hardened high-speed steel bodies, so that the total length of the flutes and pilots Rockwell C-62-63.

It has also been proven in actual practice that this type of tool has a higher cutting efficiency due to the harder back ground for the carbide tips which produces less spring back under heavy cuts for this same reason. Also, the flutes and pilots will not score or pick-up due to the hardness of the high-speed steel and long wear on the pilot.

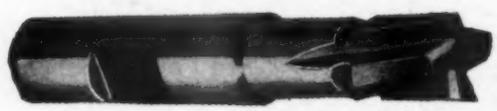
If you have a cutting tool problem, DETROIT REAMER & TOOL COMPANY would appreciate an opportunity to work it out with you.

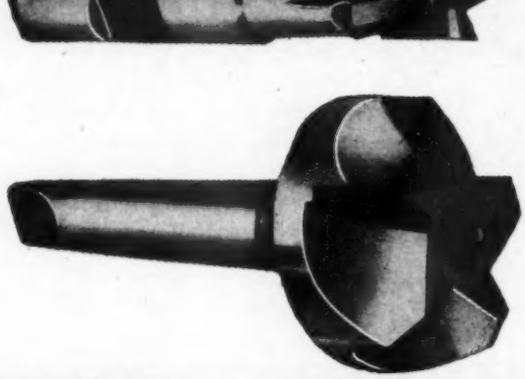
Write for QUOTATION

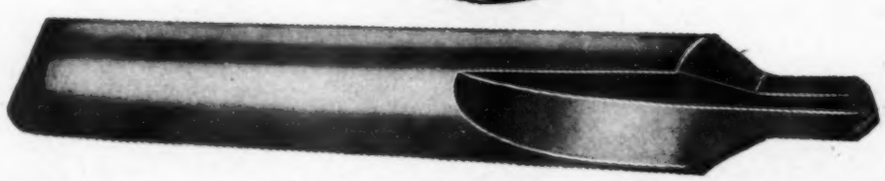
• MADE TO YOUR SPECIFICATIONS •

DETROIT REAMER & TOOL CO.
2830 E. Seven Mile Road — Detroit 12, Michigan

Manufacturers of Oil-Hole Drills, Subland Drills, Special Reamers, Circularity Relieved Reamers, End Mills and Special Tools







SUBLAND REAMERS
•
LINE REAMERS
•
CENTER DRILLS
•
COUNTERBORES
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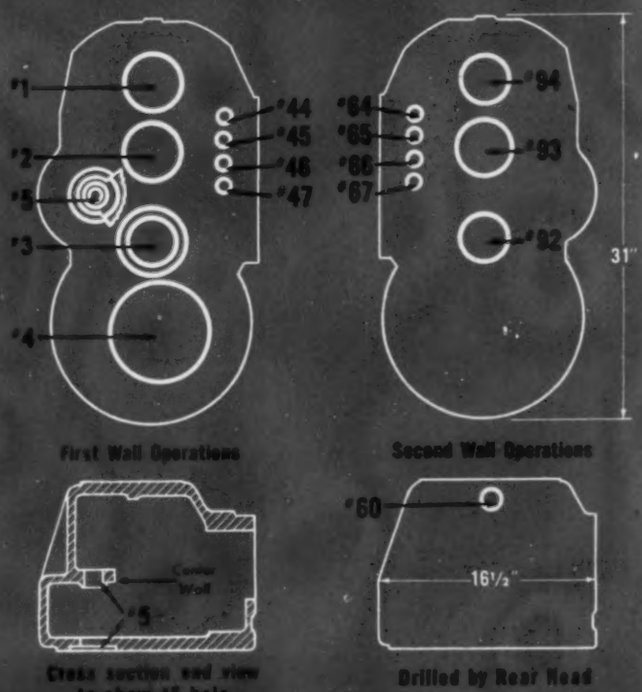
CORE DRILLS
•
END MILLS
•
Special Tools To Your Specifications

Multi-precision boring plus production

NATCO BORING MACHINE

bores holes ranging from .993" to 8.064" diameter



Seventeen transmission case holes up to 8.064" diameter are bored simultaneously within .001", plus or minus, and one hole drilled, on this NATCO special 3-way horizontal boring and drilling machine. The machine is arranged with hydraulic feed. Stationary type fixture accommodates one part while the operations are performed.

RIGHT-HAND HEAD. Combination rough and finish bore Hole #1 in first wall to 3.037" diameter and Hole #94 in second wall to 3.347" diameter. Combination rough and finish bore Hole #2 in first wall to 3.937" diameter and Hole #93 in second wall to 3.937" diameter. Combination rough and finish bore and counterbore Hole #3 in first wall to 3.751" bore and 5¼" counterbore and combination rough and finish bore Hole #92 in second wall to 3.672" diameter. Combination rough and finish bore Hole #4 in first wall to 8.064" diameter. On Hole #5, first wall, combination rough and finish bore to 2" and counterbore to 3 9/16" diameter; on center wall, combination rough and finish bore to 1.385" and face boss to 1¾" diameter. Ream four holes #44 to #47 inclusive to .993" diameter.

LEFT-HAND HEAD. On 4 holes #64 to #67 inclusive, combination finish ream to .993" and counterbore to 1½" diameter.

REAR HEAD. Drill one hole #60 for 1" pipe tap.

Production is 13 transmission cases *precision bored* per hour. For further details on NATCO boring and drilling machines, write today to NATCO, Dept. A, Richmond, Indiana.

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., RICHMOND, IND., U. S. A. • *Branch Offices:* 1809 Engineering Building, Chicago • 409 New Center Building, Detroit • 1807 Elmwood Avenue, Buffalo • 2902 Commerce Building, New York City

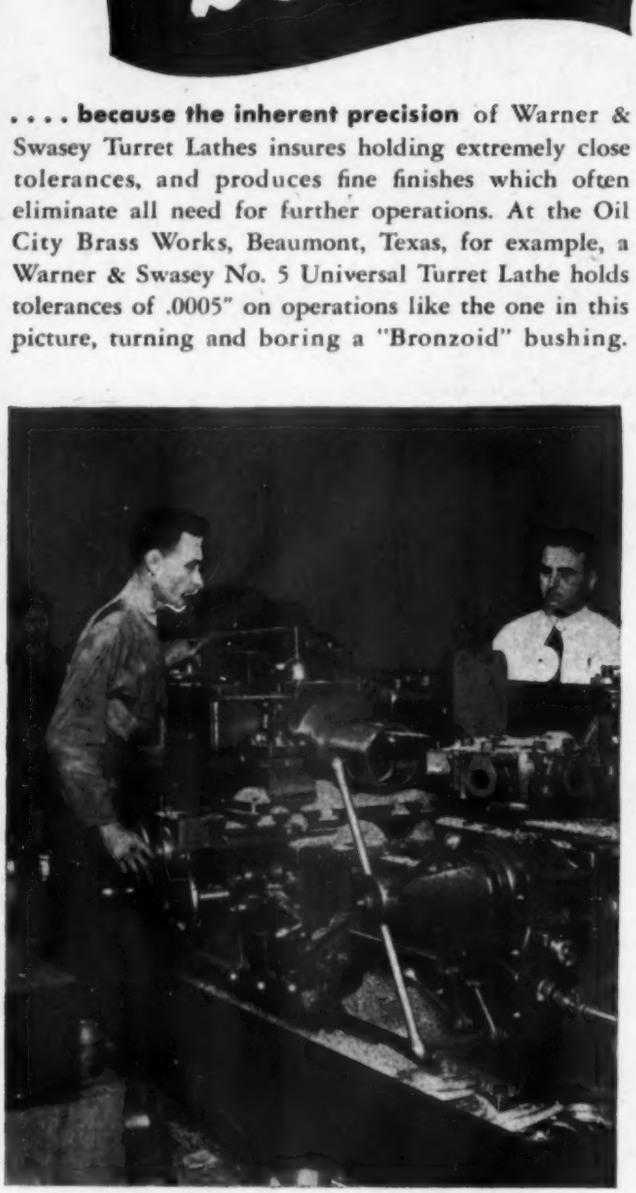
You can machine

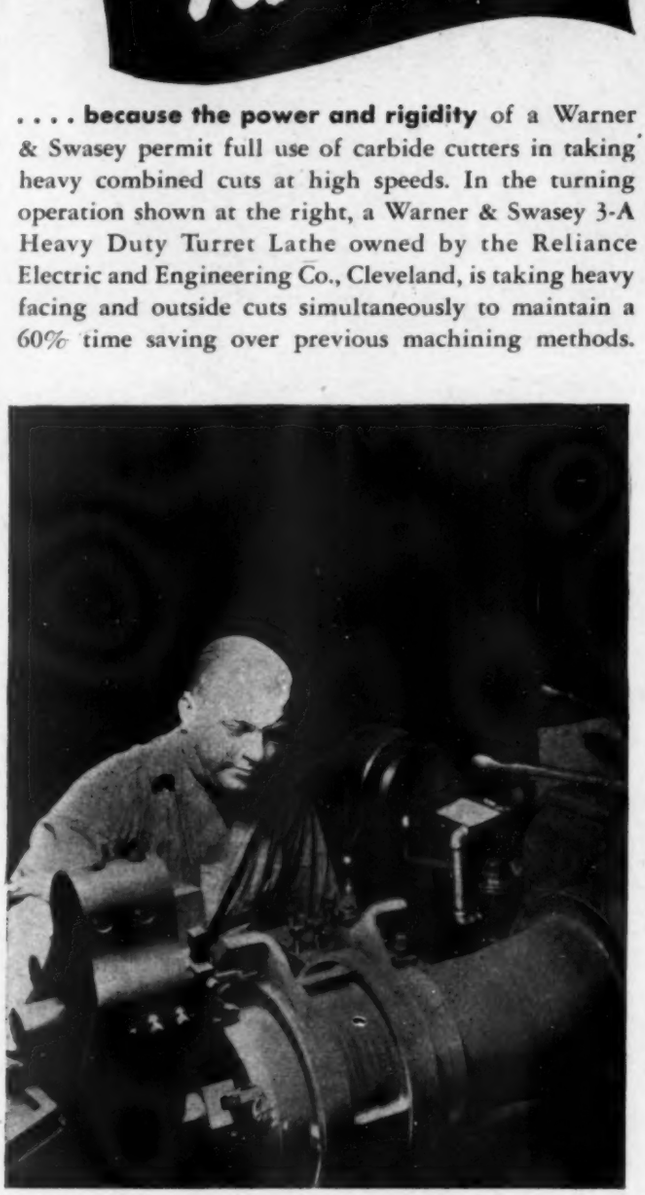
better

faster

. . . . **because the inherent precision** of Warner & Swasey Turret Lathes insures holding extremely close tolerances, and produces fine finishes which often eliminate all need for further operations. At the Oil City Brass Works, Beaumont, Texas, for example, a Warner & Swasey No. 5 Universal Turret Lathe holds tolerances of .0005" on operations like the one in this picture, turning and boring a "Bronzoid" bushing.

. . . . **because the power and rigidity** of a Warner & Swasey permit full use of carbide cutters in taking heavy combined cuts at high speeds. In the turning operation shown at the right, a Warner & Swasey 3-A Heavy Duty Turret Lathe owned by the Reliance Electric and Engineering Co., Cleveland, is taking heavy facing and outside cuts simultaneously to maintain a 60% time saving over previous machining methods.





TURRET LATHES, MULTIPLE SPINDLE AUTOMATICS . .

it . . .

for less

WITH A Warner & Swasey

. . . . because the speed, accuracy and ease of operation of a Warner & Swasey all combine to save valuable floor to floor time, and effect additional cost saving by minimizing scrap loss. Warner & Swaseys show lower maintenance costs, too! In the Baltimore Plant of the Bartlett Hayward Division of Koppers Company, seven Warner & Swasey Turret Lathes showed a maintenance cost for a seven-year period of *only $4.09 each per year!*

Why not give a Warner & Swasey representative a chance to study your metal turning operations? There is every likelihood that his recommendations on new turret lathes, accessories or tooling can also give you more accurate, faster production at lower cost.

WARNER & SWASEY
Machine Tools
Cleveland

PRECISION TAPPING AND THREADING MACHINES

SPECIALISTS IN THE PRODUCTION OF

GEARS

for individual needs

- Spur Gears
- Helical Gears
- Bevel and Miter Gears
- Worms and Worm Gears
- Internal Gears (spur and helical)
- Sprockets
- Ratchets

- Splined Shafts
- Racks
- Lead and Feed Screws
- Ground Tooth Gears (spur and helical)
- Shaved Tooth Gears (spur and helical)
- Ground Thread Worms

This organization, with 63 years of manufacturing experience, is equipped to do practically any kind of gear job. Our service assures you of Gears that possess close limits of accuracy.

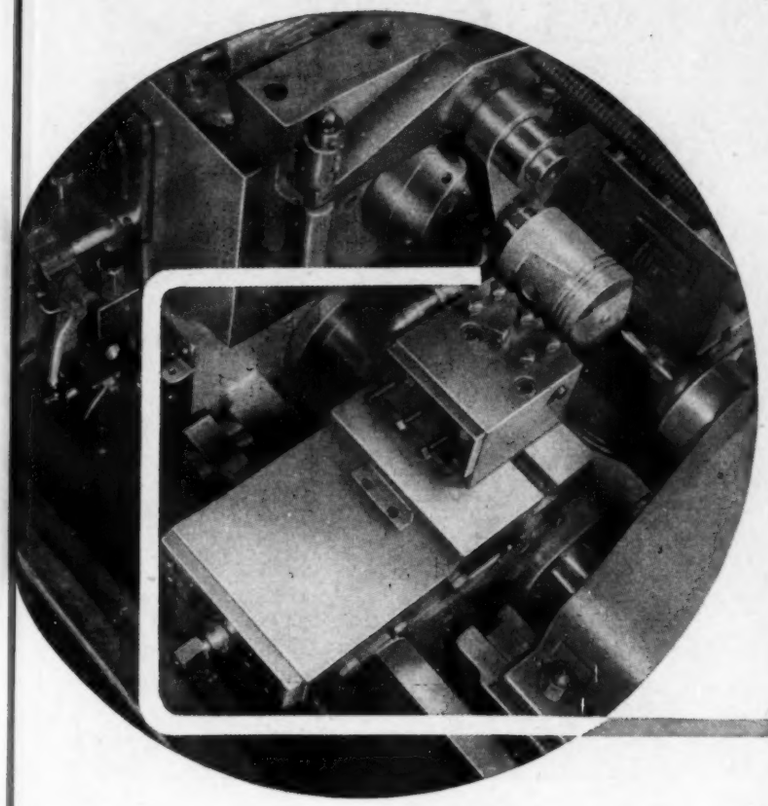
Our engineering service is available for consultation.

The ADAMS COMPANY
DUBUQUE, IOWA
ESTABLISHED 1883

A DOZEN DIFFERENT MACHINING CYCLES

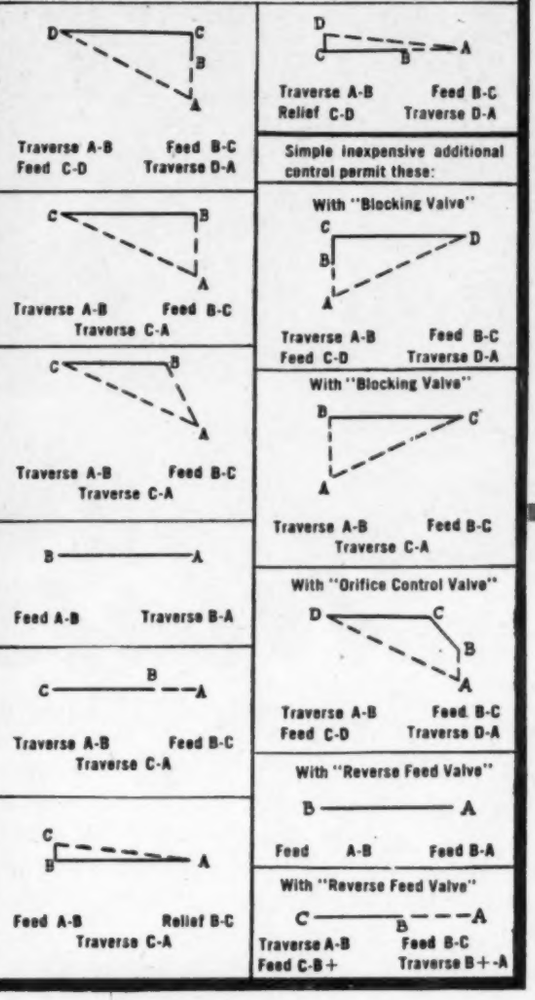
with the

FRONT CARRIAGE ALONE



The Gisholt
HYDRAULIC AUTOMATIC LATHE

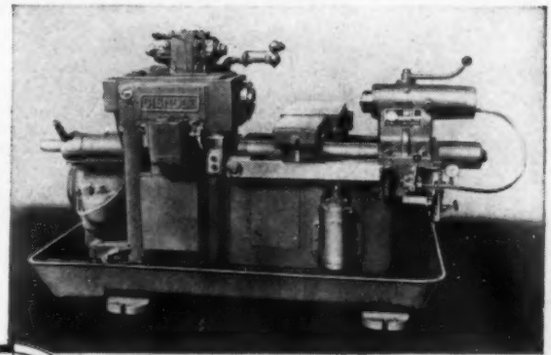
THE FRONT CARRIAGE on the STANDARD No. 12 WILL PERFORM THE FOLLOWING CYCLES



The versatility of the front carriage on this automatic lathe enables you to solve a great number of machining problems in the most efficient way.

Entirely hydraulic in operation, it permits many combinations of transverse and longitudinal motions at both feed and traverse rates. Many special combinations are possible on this standard machine. And still further variations may be obtained by means of special hydraulic equipment or cam guided blocks. A standard taper attachment can be utilized with any of the front carriage movements.

Versatility is only one of many outstanding advantages on the Gisholt Hydraulic Automatic Lathe. If speed, accuracy and easy operation can cut your costs on parts in large quantities or on a wide variety of small lots, ask for full information.



THE GISHOLT HYDRAULIC AUTOMATIC LATHE *is a genuinely rugged 12" machine. It is completely automatic in operation, remarkably easy to set up, and ideal for between-centers or chucking jobs. Write for literature.*

GISHOLT MACHINE COMPANY

1245 East Washington Avenue • Madison 3, Wisconsin

Look Ahead . . . Keep Ahead . . . with Gisholt

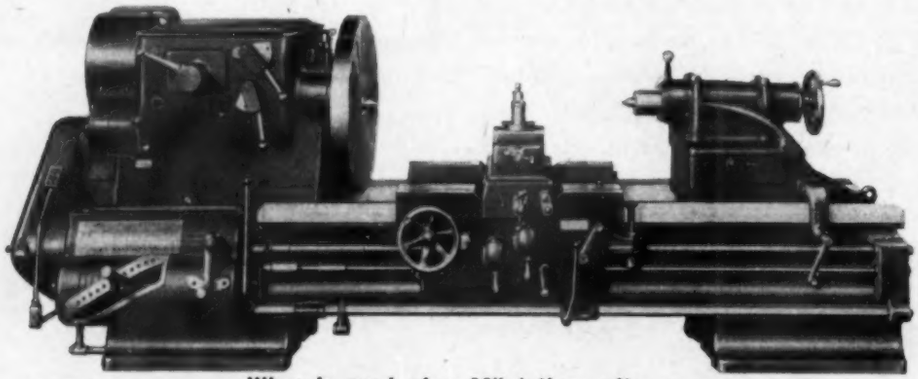
GISHOLT

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Massive—

Springfield 30" Medium Duty Geared Head Lathe

To handle those big jobs *and* the smaller ones choose Springfield Geared Head Lathes. Long, accurate performance is "built in" with the deep well-ribbed bed, with the nickel and chrome steel used and with the powerful massive design. Thirty-six changes of threads and feeds are available in the 30" lathe. Reverse gears are arranged to produce right- or left-hand threads without the use of wrenches and with a minimum of effort. Lead screws are tested to .001 inch to the foot and are used only for threads. A feed rod is supplied for all feeds.



When in need of a 30" lathe, write us for Bulletin 165.

THE SPRINGFIELD MACHINE TOOL COMPANY
SPRINGFIELD **OHIO, U.S.A.**

After months of careful research and actual production tests, Lempco is now ready to offer you the best chucking reamer ever made. It is made in two styles. Model C has a straight shank. Model CT has a tapered shank.

The new Lempco Reamer can be used in place of any standard reamer without changing set up. They will produce a smooth finish even when used to finish holes with keyways, slots, oil grooves or other interruptions.

Lempco Chucking Reamers are available in sizes from ¾" to 1 7/32". They have an expansion range of .025" to .031" according to size. These reamers *are not deformed when expanded.* They have straight line expansion, thus assuring a constant cutting surface over the entire length of the blade at all times. Blades can be resharpened 8 to 10 times, then economically replaced.

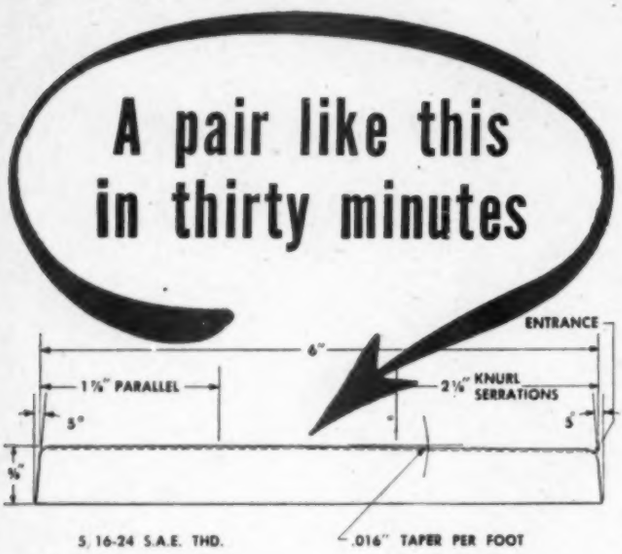
Decide right now to buy Lempco Adjustable Chucking Reamers. They will enable you to get better and more accurate production.

WRITE TODAY FOR FULL DETAILS AND PRICES OF THE NEW LEMPCO CHUCKING REAMER

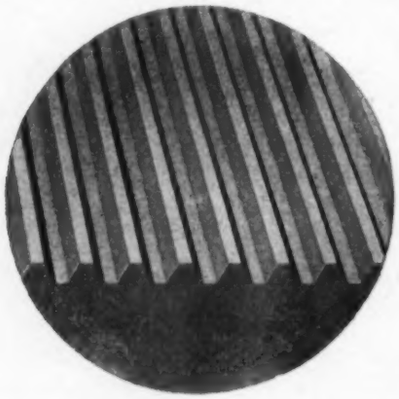
GRIND thread rolling dies?

...*the answer is* **YES!**

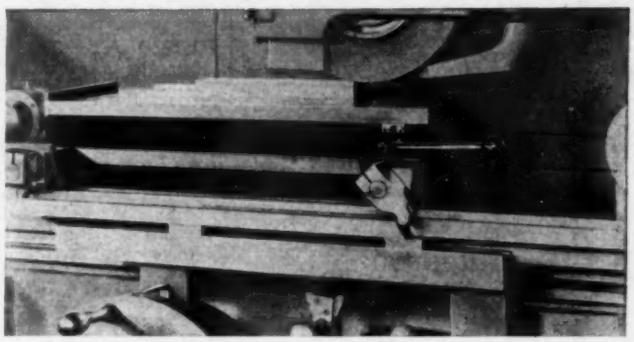
Now—through a new application of THOMPSON TRUFORMING—you can produce accurate duplicate roll thread dies and eliminate subsequent corrective operations formerly required. An example is the roll thread die shown here.



This is the Stationary Die (a perfect mate to the Moving Die not shown). Both were ground on a THOMPSON TRUFORM grinder from heat-treated alloy steel in less than thirty minutes. Note the radii, the precise taper and flat section. This is produced with a single cut—to full depth of thread form without resetting.



Enlarged tooth section shows form of threads and helix angle. By TRUFORMING dies are perfectly matched . . . there is no distortion.



Deformities are eliminated by TRUFORMING because work is finished right in hardened steel. Note the special forming fixture in the photograph, which makes possible completely automatic and highly accurate grinding of the longitudinal contour. These Thompson die grinding features are new with patents applied for.

Longer die life and greater die accuracy, plus ability to regrind dies without drawing, are three great advantages you get with this THOMPSON TRUFORMING application.

Write at once for complete details . . . Address Dept. **32.**

The Thompson Grinder Company • Springfield, O.

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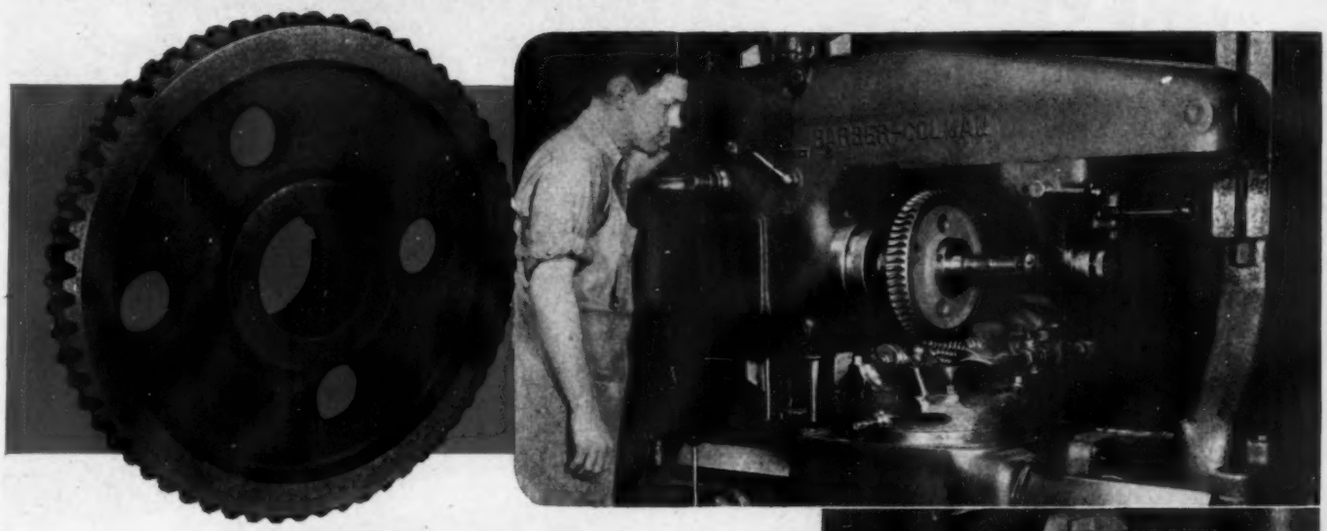
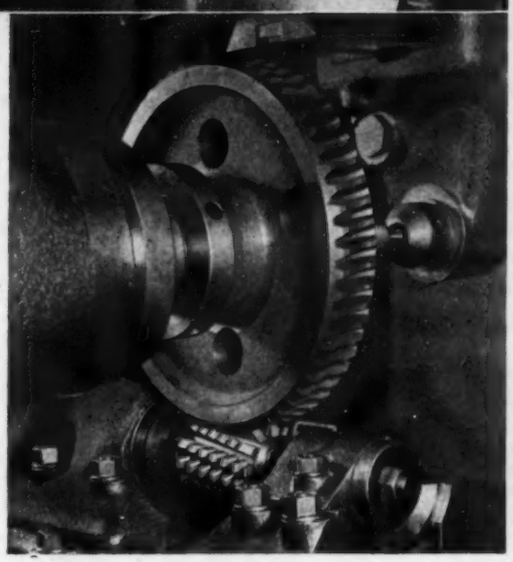
SPECIAL SKILLS NEEDED FOR MACHINE OPERATIONS?

TYPE D HOBBING MACHINE OFFERS HELP!



Adaptability of the Type D Hobbing Machine to hobbing high precision work is shown here in an operation cutting index worm gears. Adjacent tooth spacing error is held within .0004", and total spacing error within .001". High degree of finish is maintained.



● Along with today's high costs of production and low productivity, it is often difficult to find sufficient skilled operators to keep production flowing smoothly and economically. The Type D Hobbing Machine offers time-saving advantages which help to solve these problems on gear cutting operations.

Hydraulic operation and automatic cycling provide easy control over all machine movements, so that the operator is required only to load and unload the work and activate the cycle levers. No special training is needed to set up and operate the machine efficiently — feed and speed adjustments are made simply by changing the dial settings.

SAVE ON MAINTENANCE All operating units are of standard construction and easily accessible, requiring a minimum of down-time for adjustments. Automatic lubrication assures minimum wear. Sleeve-type bronze bearings and tough steel spindles seldom require attention.

These features enable any operator to maintain an uninterrupted flow of work from the machine. In addition, the wide range of work handled makes the Type D even more adaptable for increased output and lower unit costs.

SEND — for complete information on the Type D Hobbing Machine and its applications. Production estimates furnished on request. Ask for Bulletin F-1477.

QUICK FACTS

Part — Index Worm Gear; 60T; .666 C.P.; 1.333" lead, L.H.; 13.159" O.D. x 2¼" face.

Material — Alloy cast iron

Feed — .005" per rev. of work

Speed — 75 R.P.M.

Cutting Time — 15 minutes

Hob Life — 20 gears per setting

Accuracy — .0004" maximum adjacent spacing error, .001" total spacing error, .0005" kickout when rolled with master worm.

ACCURACY-RIGIDITY-POWER BARBER B-C COLMAN FOR HI-PRODUCTION HOBBING

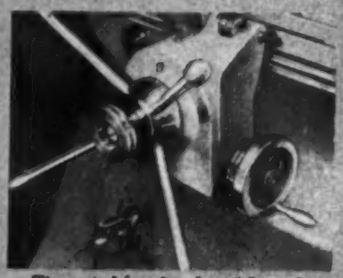
Barber-Colman Company

GENERAL OFFICES AND PLANT 111 LOOMIS ST., ROCKFORD, ILLINOIS, U.S.A.

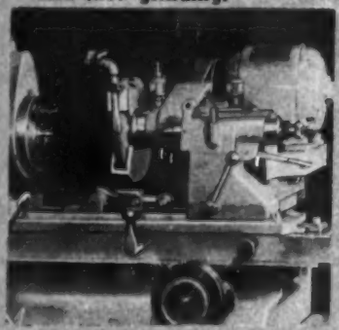
For **TOOL ROOM** *and* **FINE PRODUCTION**
ON PARTS REQUIRING
INTERNAL, EXTERNAL or SHOULDER GRINDING

Now You **CAN ACHIEVE A GREATER VARIETY OF PRECISION OPERATIONS**

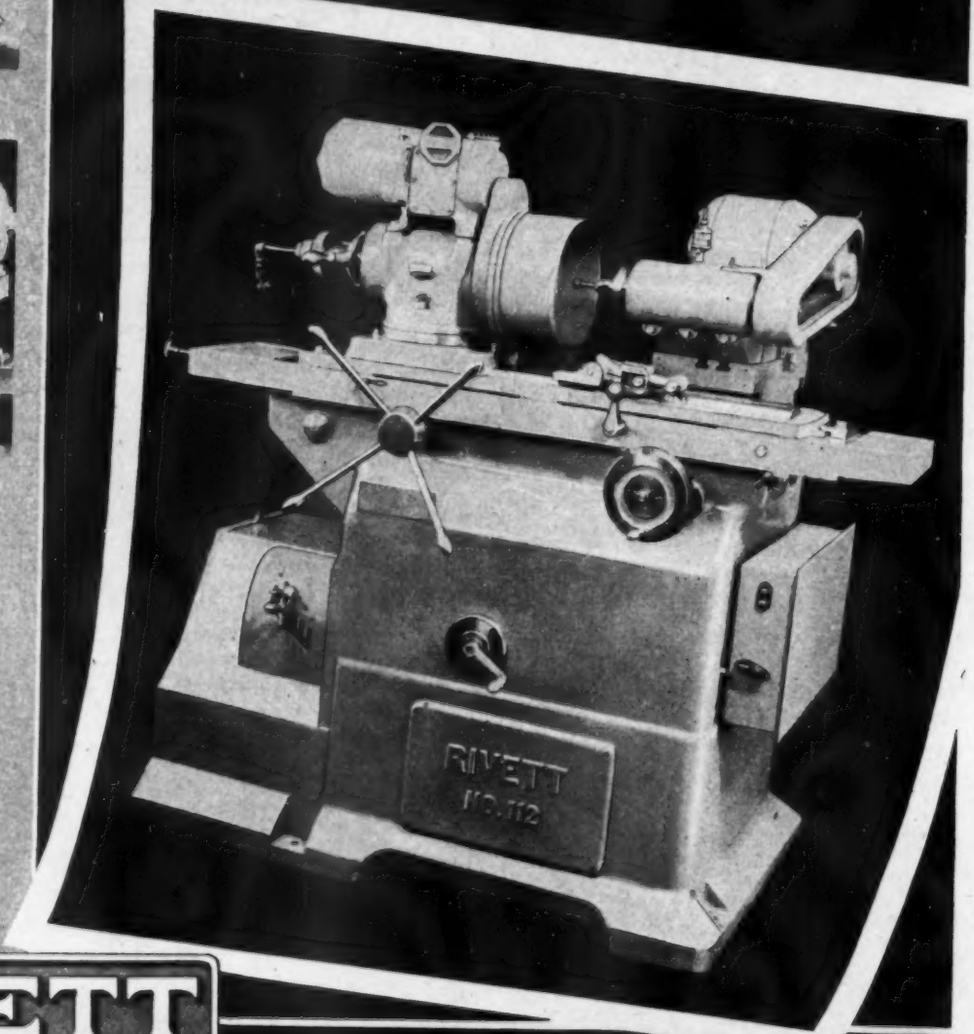
The Rivett No. 112 Universal Grinder can be quickly set up for straight, taper, bevel or straight and bevel grinding on one or many pieces. Interchangeable brackets are selectively mounted on the cross slide for internal and external operations. Power driven table stroke can be controlled for exact positioning on internal and external shoulder grinding. Extreme simplicity of design assures easy and efficient operation by even a lay machinist. Write for Bulletin No. 112.



Fine table feed with micrometer stop for shoulder and face grinding.



Spindle, tail stock and dead center drive for external grinding.



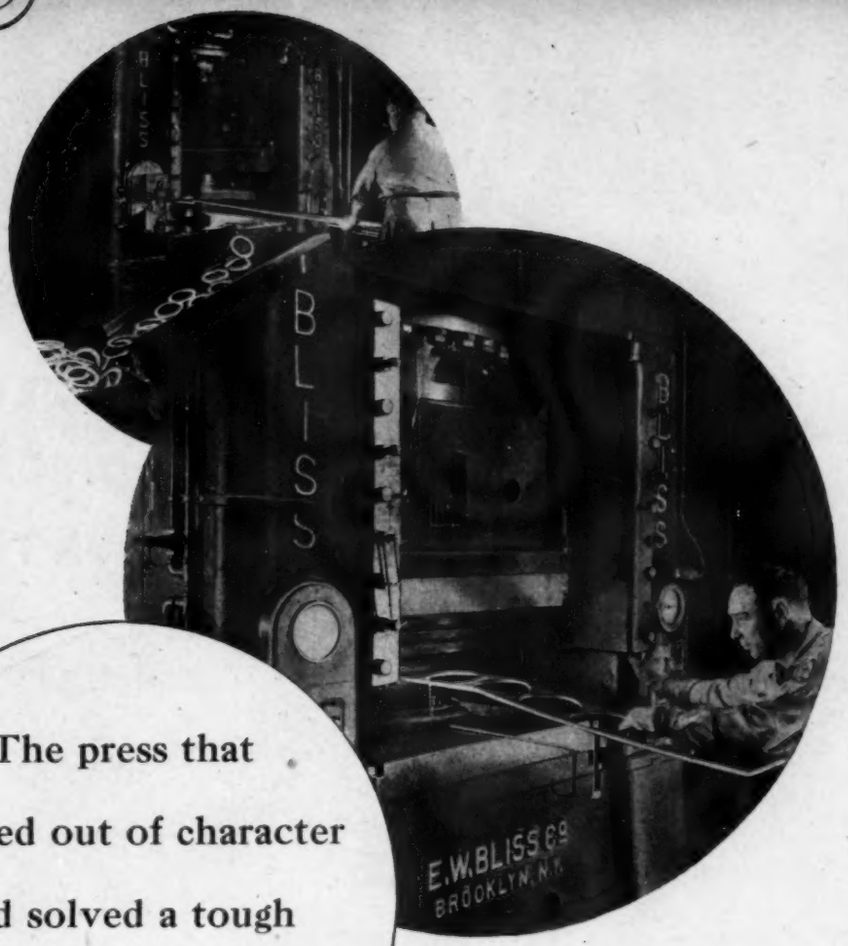
SPECIFICATIONS

Grinding cap., hole dia.	½" to 8"
Grinding cap., outside dia.	up to 8"
Automatic table travel	½" to 8"
Table speeds	18 selective
Swing over table	14"
Workhead swivel	90°
Table swivel	5°
Cross slide swivel	90°
Collet capacity	1"
Grinding spindle speeds: Internal	5000 to 26000 r.p.m.
External	3300 r.p.m.
Net weight with motors	3700 lbs.

RIVETT

RIVETT LATHE & GRINDER INC.

BRIGHTON, BOSTON, MASS.



The press that stepped out of character and solved a tough production problem

Putting a press through paces other than its intended applications calls for the right combination of operator ingenuity plus press flexibility.

Goetze Gasket and Packing Company is supplying the operating "know-how" and this Bliss 750-ton Hydro-Dynamic Press is doing the rest. That's why you see this hydraulic press stepping out of character to blank cold 4,000 half-inch thick steel alloy rings daily where previous methods and equipment for blanking the rings hot involved a slower manufacturing cycle and very limited output.

"Naturally the press paid for itself in no time," we're told by Goetze's Plant Engineer. "Over and above its regular hydraulic pressing applications, it's the busiest press in the shop because it's so adaptable for both long and short runs. During eight years of constant use, we've had very little maintenance to worry about. Considering that we feed as much as 50,000 pounds of heavy steel stock in a single day to produce these 10″ diameter rings—it speaks well for the press' design and solid construction."

Such extra-utility is an added dividend that ninety years of press manufacturing builds into Bliss equipment of every type and size.

Bliss engineers are trained to survey your press needs, evaluate the applications you have in mind and recommend the right type of press—mechanical or hydraulic—solely on its engineering merits. Isn't this the kind of unbiased counsel you'd like brought to your problem?

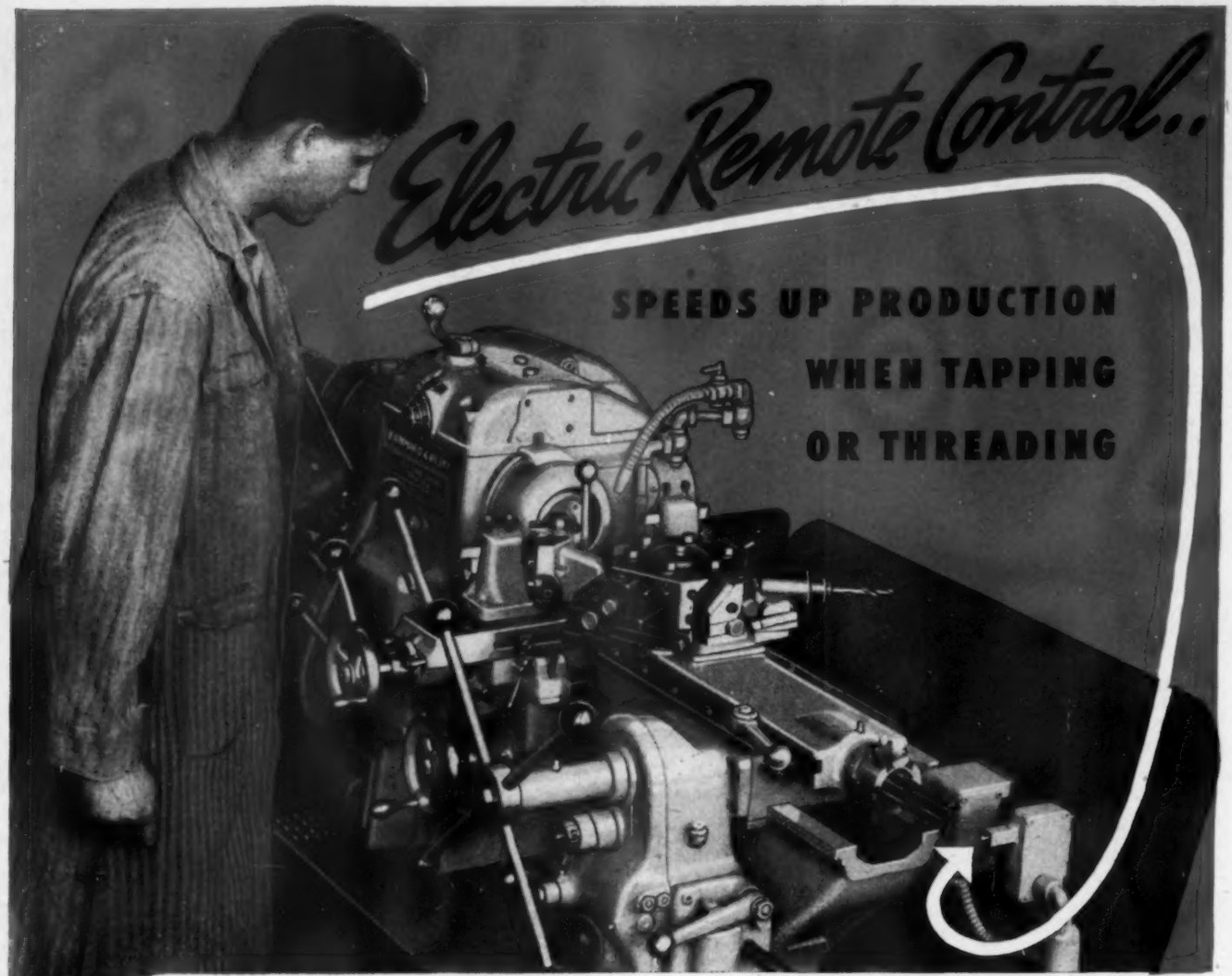
E. W. BLISS COMPANY, DETROIT 2, MICHIGAN

Mechanical and Hydraulic Presses, Rolling Mills, Can and Container Machinery

WORKS AT: Brooklyn, N. Y.; Toledo, Cleveland, Salem, Ohio; Hastings, Mich.; Derby, England; St. Ouen sur Seine, France. • SALES OFFICES: Detroit; Brooklyn; Cleveland, Dayton, Toledo, Ohio; Lansing, Mich.; Chicago; Philadelphia; Rochester; New Haven; Boston; Toronto.

STAY AHEAD WITH *Bliss*

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY



When tap reaches desired depth, the spindle automatically reverses. Then after the tap has backed out, spindle rotation again changes automatically to the original direction.

The automatic reverse is controlled by adjustable dogs on the independent stop screw drum of the turret slide, and will control the reversal to within a few thousandths of an inch of turret slide travel.

An automatic 2 to 1 speed change may be similarly obtained, and is a convenient time saver between turning and threading, or between drilling and reaming operations.

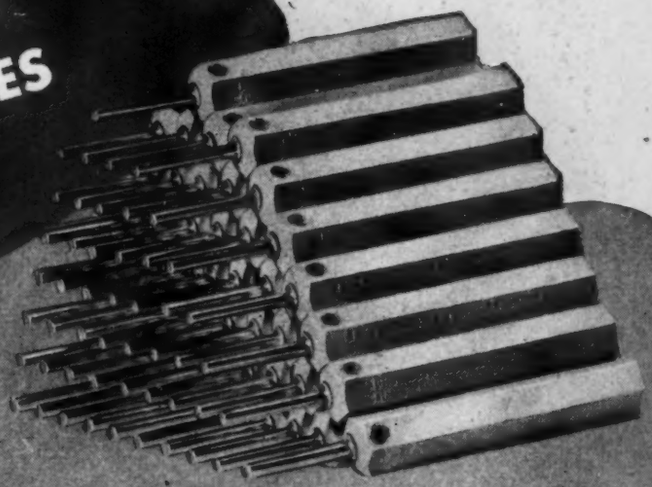
Our No. 1 and No. 2 Geared Electric Turret Lathes are now offered with either one or both of these job-speeding features.

We will gladly furnish additional information on request.

BARDONS & OLIVER, INC.
1133 WEST 9TH STREET • CLEVELAND 13, OHIO

Van Keuren

CARBOLOY WIRE TYPE PLUG GAGES



1 VAN KEUREN CARBOLOY GAGE = 50 TOOL STEEL GAGES

Wire type plug gages were originated by The Van Keuren Co. in 1925 and are now recognized as the most economical gages for measuring small holes.

The original wire type plug gages were made of tool steel. The use of high speed steel doubled gage life. Precision chrome plate gave five times the life, and now gages of carboloy are available with fifty times the life of tool steel. All of these materials are still in use and have their particular applications and advantages.

VK Carboloy gages are made in sizes from .020" diameter to .250" diameter. They are available only in the wire type design as this is by far the most economical small plug gage. In cases where it is desired to use Van Keuren carboloy wire type Go units with existing No Go units of the taper insert design, special handles can be furnished for this purpose. Van Keuren wire type plug gages assure longer lasting precision and lower gage cost because the entire 2" length of gage unit can be used. When the end becomes worn it is ground off and a new section of the original accuracy is moved out for use. The wire type unit is securely held in the handle by a split bushing and a headless set screw.

VK Carboloy wire type plug gages are made to Class B accuracy, plus .00005" minus .00000" on the Go unit and plus or minus .000025" on the No Go unit. Closer or wider tolerances can be supplied if desired.

On your next order specify VK wire type plug gages. VK Carboloy for long runs because of the enormous saving in gage cost. VK Carboloy for fussy jobs because of the infinitesimal gage wear and insurance that the parts will be within the specified limits. VK Tool Steel—High Speed—Precision Chromium for less exacting jobs. You will be assured of the best in accuracy, quality and delivery.

Write for circular C 35 on Carboloy wire type plug gages, Thread measuring wires and Gear wires.

Write for your copy of catalog and handbook No. 33. It contains complete information on Van Keuren precision gages and instruments and valuable engineering formulas and data on measuring problems.

THE Van Keuren CO., 176 WALTHAM STREET, WATERTOWN, MASS.

28th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

FOR THE SURFACE GRINDER WITH *ALL* THE WORTH WHILE FEATURES

-Get a HILL

Here is a surface grinder built in two types, Horizontal Spindle or Vertical Spindle with –

- *Open Side Accessibility*
- *100% Hydraulic Table Drive*
- *Built-in Spindle Motor*
- *Centralized Accessible Controls*
- *Low Pressure Hydraulic System*
- *One Shot Lubrication*
- *Adequate Safety Devices*

• The "HILL" Vertical Spindle Grinder for rapid stock removal and accurate grinding of flat surfaces —recommended for accuracy, speed and finish— features that mean increased precision production. Made in table widths of 18", 24" and 30" with table lengths from 5 to 20 feet.

• The "HILL" Horizontal Spindle Grinder for a wide range of grinding — flats, angles, irregular and special shaped surfaces — ideal for maintaining close tolerances with superior finish. Made in table widths of 18", 24", 30" and 36" with table lengths from 5 to 20 feet.

HILL ACME TOOLS FOR INDUSTRY

RECOMMENDATIONS, ESTIMATES AND BULLETINS ON REQUEST

THE HILL ACME COMPANY

6400 BREAKWATER AVENUE • CLEVELAND 2, OHIO

"HILL" HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING • THREADING • TAPPING MACHINES "CANTON" ALLIGATOR SHEARS AND PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES AND SHEAR BLADES

RAPID WORK . . . QUICK CHANGE

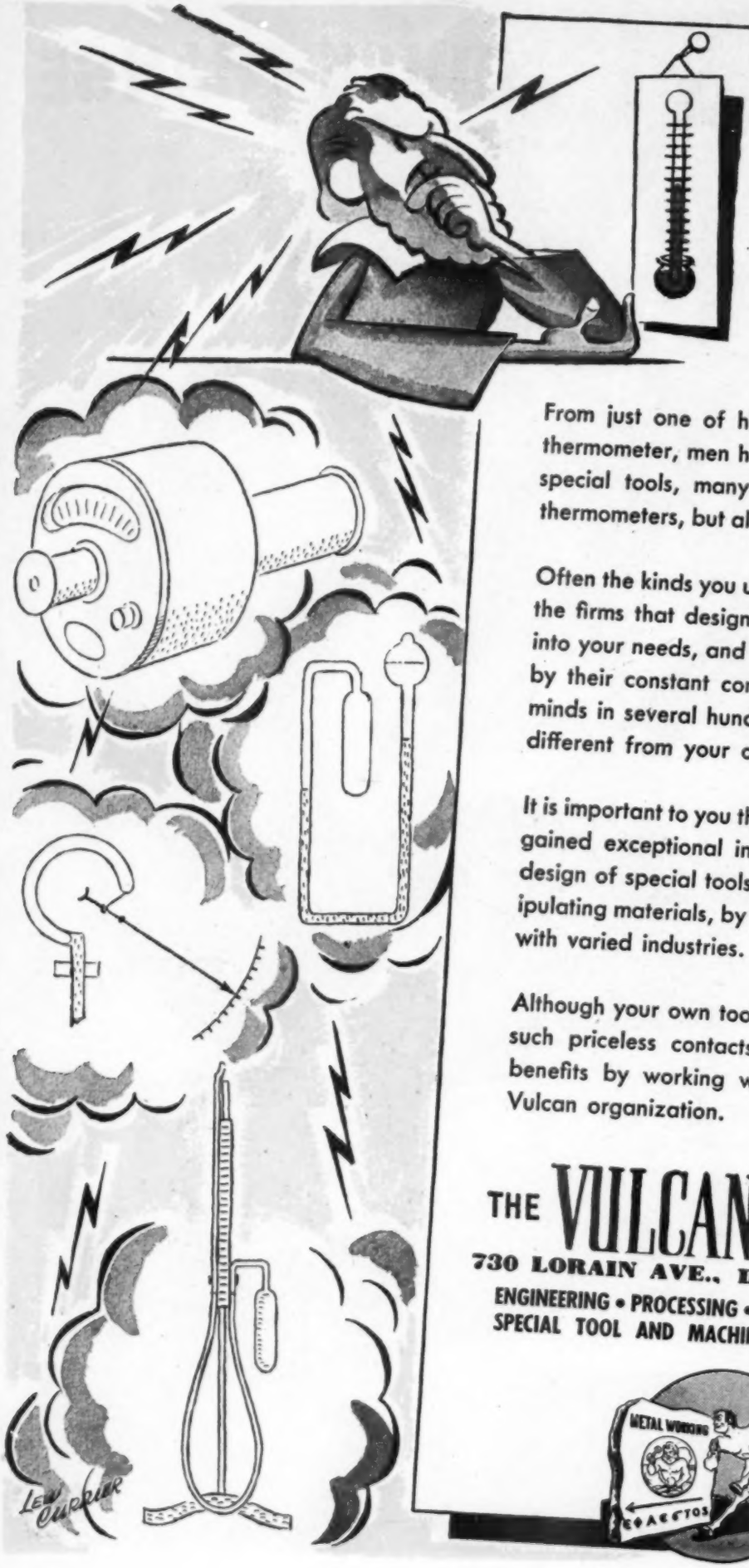
with Continental Counterbores . . .

You can reduce your tool cost, improve accuracy, and increase production with the Continental complete line of standard interchangeable cutting tools. Cutters have a balanced, indestructible drive—originated by Continental—that will not stick, will not break, and is hand detachable.

CONTINENTAL TOOL WORKS

Division of Ex-Cell-O Corporation

DETROIT 6, MICHIGAN



You have Galileo Galilei to thank

From just one of his terrific inventions, the thermometer, men have developed scores of special tools, many of them wholly unlike thermometers, but all designed to gage heat.

Often the kinds you use are superior because the firms that designed them gained insight into your needs, and the ways to meet them, by their constant contact with the brightest minds in several hundred industries that are different from your own.

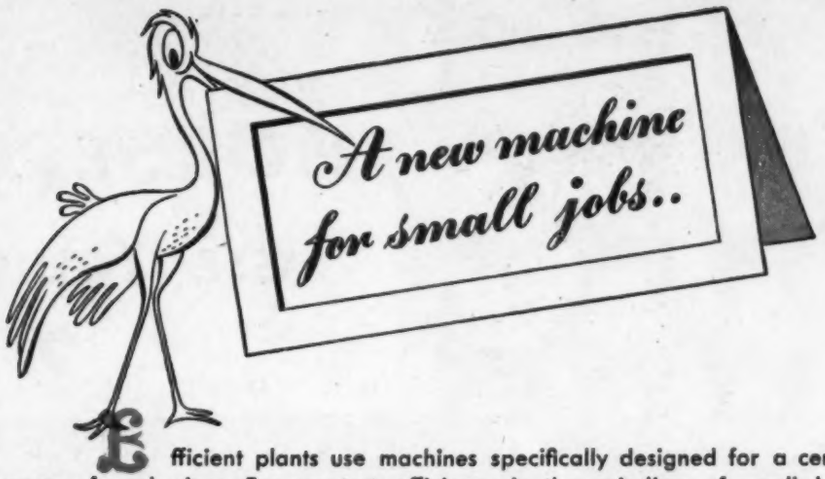
It is important to you that Vulcan has similarly gained exceptional insight and skill, in the design of special tools for gaging and manipulating materials, by its invaluable contacts with varied industries.

Although your own tool room does not have such priceless contacts it can obtain their benefits by working with the 30-year old Vulcan organization.

THE VULCAN TOOL CO.

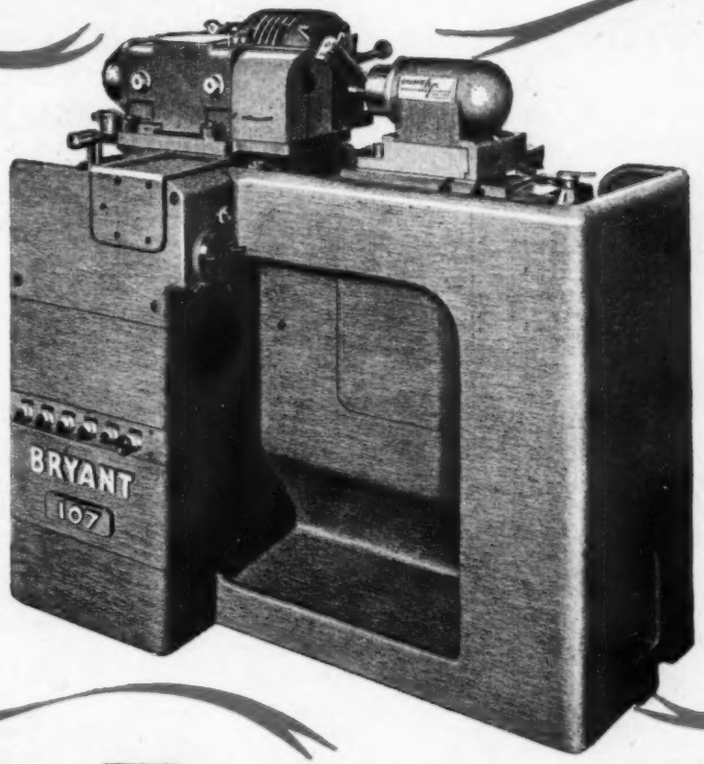
730 LORAIN AVE., DAYTON 10, OHIO

ENGINEERING • PROCESSING • DESIGNING • BUILDING
SPECIAL TOOL AND MACHINERY MANUFACTURING



Efficient plants use machines specifically designed for a certain range of work sizes. For greatest efficiency in the grinding of small holes (⅛" to 3"), Bryant offers the new, small Series 107 Internal Grinder. ● The Series 107 is designed for tool room and small lot grinding. It has a chuck swing of 9 inches, a maximum traverse stroke of 6 inches and a maximum grinding stroke of 4 inches. Provision can be made for 11" swing. Preloaded ball bearings are used on both cross and longitudinal slides. This allows the use of a very light wheel slide, yet provides the utmost rigidity and sensitivity necessary for extremely precise work with quality finish. The new Series 107 uses the Bryant High Frequency Wheel Head as standard equipment. This provides direct wheel spindle drive at speeds up to 100,000 r.p.m., assuring the efficient surface speeds so necessary when grinding small bores. Belt drive is available for slow speeds. ● Although a minimum of floor space is required, operator comfort has been carefully considered. The simplified controls are conveniently located, and the operator may operate the machine, either when standing or sitting. Write for complete details on this new, small internal grinder that is functionally designed to grind small bores.

THE *NEW* BRYANT
SERIES 107
INTERNAL GRINDER
FOR SMALL BORES



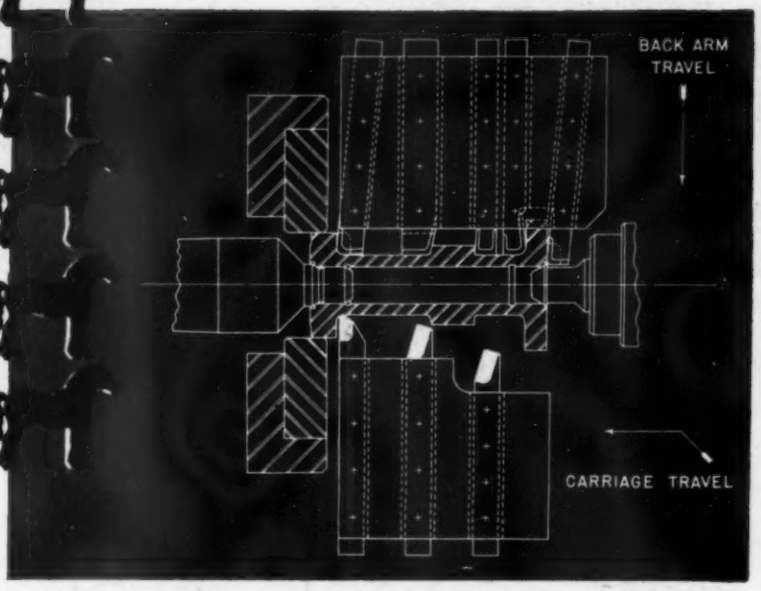
Send for the Man from

BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.

BRYANT

How much HORSEPOWER are You using ?



1st. Turning Operation on an Automobile Transmission Counter Gear

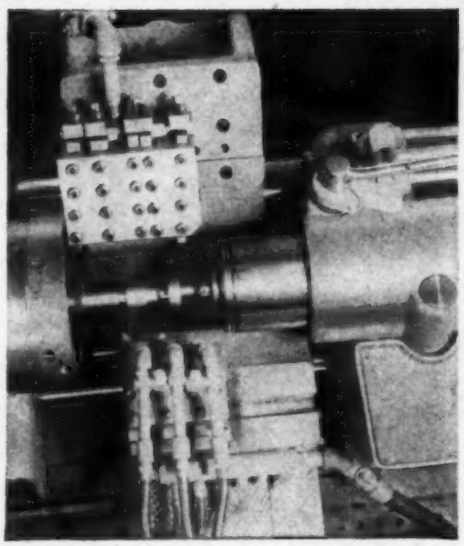
In this operation a 16" Fay Automatic Lathe transmits **40 HORSEPOWER** to remove **25 ounces of metal in 19 seconds** with carbide cutting tools.

Carbide cutting tools have increased horsepower requirements as much as 300 per cent. They have increased cutting speeds 200 to 500 per cent.

Be skeptical of the production efficiency of your metal turning equipment. The chances are that turning accounts for 25 per cent or more of all machining time in your plant—that this is your major production expense.

There are cases in our files of savings of hundreds of dollars a month in the manufacture of a single part by the efficient use of carbide cutting tools on Jones & Lamson machines. Our Turret Lathes and Fay Automatic Lathes are designed specifically for the most efficient use of these tools.

Send for our folder "Turning Automobile Counter Gears". Or better yet, telephone or write for a Jones & Lamson engineer who will be glad to consult with you on all phases of your metal turning problems.



JONES & LAMSON MACHINE COMPANY, Springfield, Vermont, U. S. A.

Manufacturer of *Fay Automatic Lathes* and Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers • Ground Thread Flat Rolling Dies

Sidney Lathes

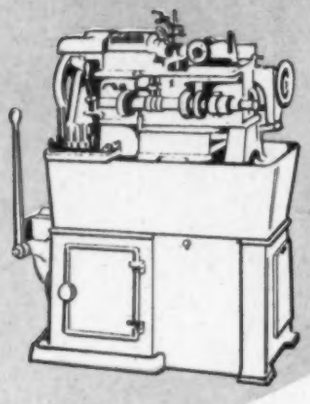
● The primary objective of Sidney Lathes is accuracy. Sidney obtains this from good basic design, sturdy construction, and skilled workmanship. For example, the continuous Tooth Herringbone Geared Headstock is an exclusive Sidney feature which assures a smooth flow of power, and the double wall bed with ample cross girting provides the rigidity so essential when using carbide tools. Thus dependable accuracy at today's high speeds and heavy feeds is assured by the rigid construction of Sidney Lathes from the floor up. Full descriptive bulletins on all sizes available. Write.

The SIDNEY MACHINE TOOL *Company*

Builders of Precision Machinery • • • SIDNEY, OHIO • • • *Established 1904*

TOP PRODUCTION TEAM

for HIGH Accuracy and LONG Runs



AUTOMATIC SCREW MACHINES *PLUS*

Staples CARBOLOY-TIPPED CEMENTED CARBIDES

STUB SCREW MACHINE REAMERS

(A) Staples Carboloy - tipped Expansion Stub Screw Machine Reamer.

Staples patented expansion principle permits easy adjustment of tool to .0001". Expansion plug limited to $^{3}/_{32}$" extension beyond tool end (width of cut-off blade) eliminates possibility of plug striking bottom of drilled hole. Can also be furnished with plug flush with tool end if specified.

(B) Staples Carboloy - tipped Solid Stub Screw Machine Reamer.

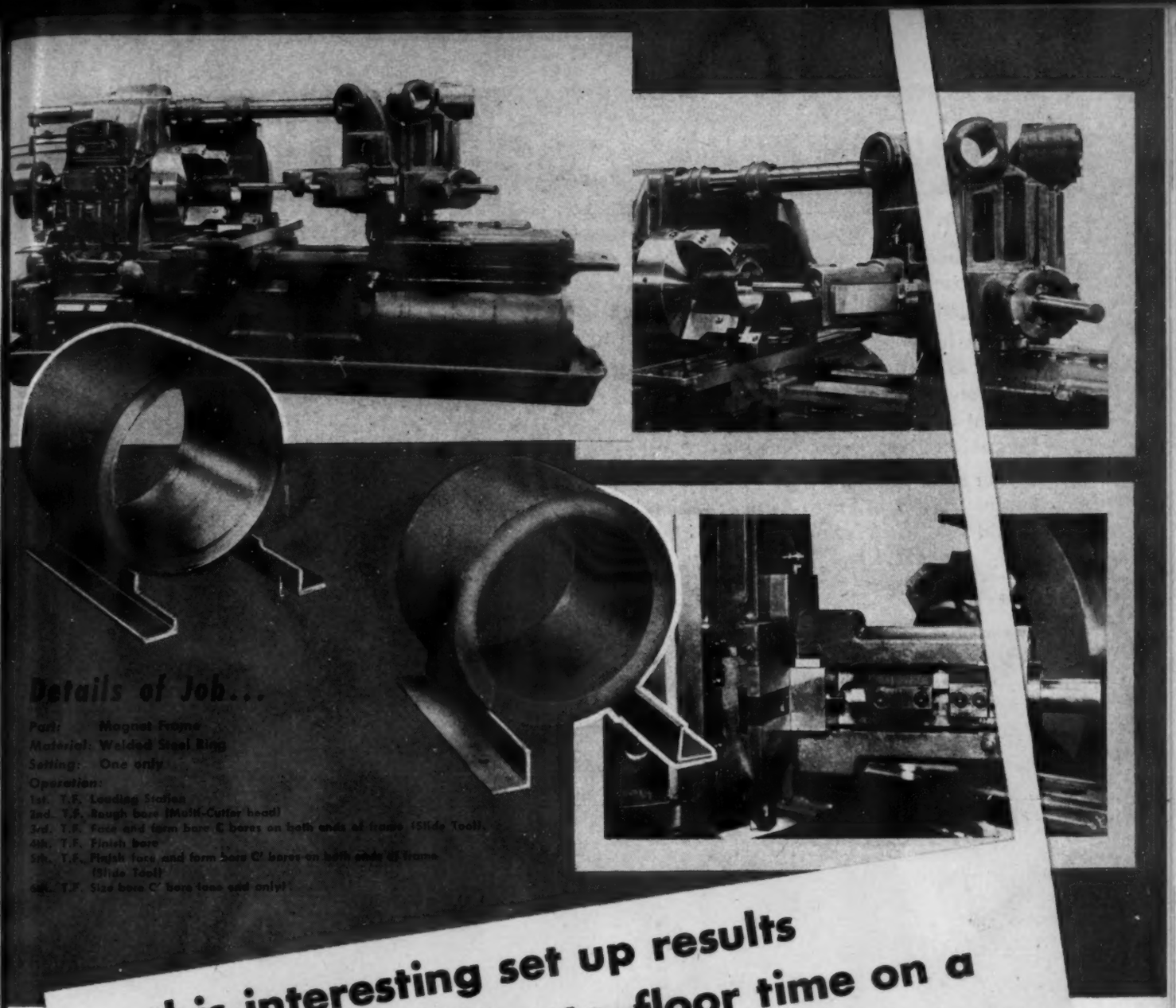
Staples stub screw machine reamers cut production costs on automatic screw machine operations by eliminating frequent down time for reamer sharpening. Carboloy surfaces are highly resistant to wear—far exceed H.S.S. on tool life. Tools hold accurate diameters, permitting long runs on exceptionally close tolerance work.

These reamers are made both in solid and expansion types. Tools are stocked semi-finished and are ground to size specified with tolerance of .0003" on diameter. A complete range of sizes is available for immediate delivery.

THE STAPLES TOOL COMPANY
CINCINNATI 25, OHIO
Distributors in Major Cities

Staples CARBOLOY-TIPPED CIRCULAR CUTTING TOOLS

REAMERS • CORE DRILLS • SPOT FACERS • COUNTERBORES • END MILLS • SHELL END MILLS • ALSO A COMPLETE LINE OF CIRCULAR SPECIAL TOOLS



Details of Job...

Part: Magnet Frame
Material: Welded Steel Ring
Setting: One only
Operation:
1st. T.F. Loading Station
2nd. T.F. Rough bore (Multi-Cutter head)
3rd. T.F. Face and form bore C bores on both ends of frame (Slide Tool)
4th. T.F. Finish bore
5th. T.F. Finish face and form bore C' bores on both ends of frame (Slide Tool)
6th. T.F. Size bore C' bore face and only!

—this interesting set up results in fast floor-to-floor time on a P&J 6 DREIX AUTOMATIC

P&J Tooling flexibility is again demonstrated on this set up. The magnet frames illustrated are machined to close specified tolerance with utmost convenience on the part of the operator. The fact that floor-to-floor time is only 11.09 minutes per piece is evidence of the fast machining time made possible by carefully engineered tooling.

Another important feature of this set up is the fact that the machine is equipped with an air chuck, making it possible for one operator to very easily handle three machine units.

From the standpoints of quantity, quality and low cost per piece, every set up on P&J machines is interesting. It will be to your advantage to give P&J engineers an opportunity to help you work out an improved method of handling your duplicate parts production. No obligation, of course.

P&J

POTTER & JOHNSTON MACHINE CO.

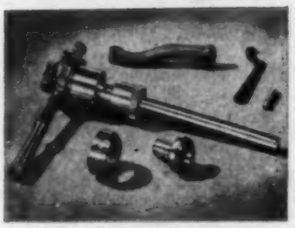
PAWTUCKET, RHODE ISLAND

Increase Shop Capacity and Efficiency

Increase shop efficiency and you increase production capacity. Work moves smoothly, swiftly, surely, and in greater volume, through the efficient shop. Modern, efficient, precision machine tools are one of the first essentials for maximum efficiency.

Famous for versatility, South Bend Precision Lathes bring peak efficiency to shops where frequent changes of set-up are called for and a variety of materials are used. And their modern design, with convenient controls and full quick change gear equipment, means less fatigue and less "machine scrap" due to such causes.

If your shop problem is to increase efficiency, it will pay to consider the installation of South Bend Precision Lathes when new equipment is added, or present equipment is replaced.



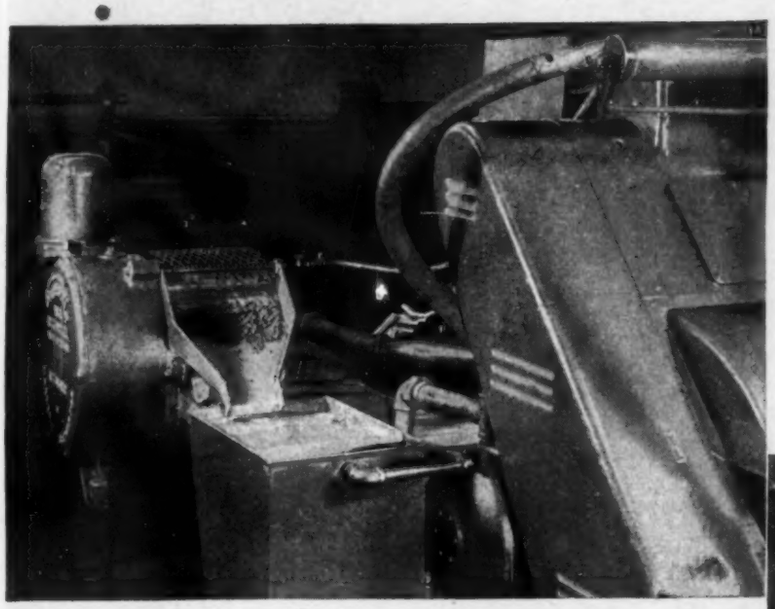
HANDLEVER COLLET ATTACHMENT
Permits releasing and feeding bar stock through the collet without stopping the lathe. Available with hardened ground steel collets, soft brass collets, or a combination of both. Write for Catalog No. 77 which shows all attachments.

Machining to split-thousandth accuracy is easy with a 16-inch South Bend Precision Toolroom Lathe.

Send For This Catalog
Write for your copy of Catalog 160-D which shows in color all styles and sizes of South Bend Toolroom, Turret, and Engine Lathes. Made with 9", 10", 13", 14½", and 16" swings. Accessories and attachments also shown.

SOUTH BEND LATHE WORKS
LATHE BUILDERS SINCE 1906
419 EAST MADISON STREET SOUTH BEND 22, INDIANA

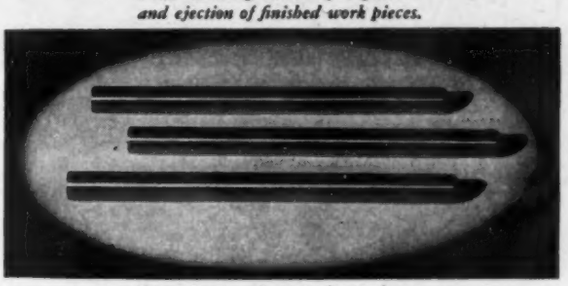
MAINTENANCE REDUCED



View showing Separator installed with Centerless Grinder.

Removal of Sediment Eliminated! Coolant Life Prolonged to Normal Structural Breakdown!

View showing action of Separator and ejection of finished work pieces.



View showing close-up of actual surface finish on completed pieces.

USING A BARNESDRIL MAGNETIC COOLANT SEPARATOR ON CENTERLESS GRINDING OPERATIONS

"Savings in time and cost of coolant! Coolant free from metal particles and abrasive! Improved work finish with no scratches!" This is the report from one manufacturer using a **BARNESDRIL** Magnetic-Automatic Coolant Separator on a centerless grinder producing 62 ground steel tubes per minute. Previous to installation of the Separator, coolant was cleaned out once a week due to accumulation of sludge and sediment. Now it is only necessary to shut the machine down once a month, for clean-out due to normal structural breakdown of the coolant. Circulation by this process allows complete aeration, preventing stagnation.

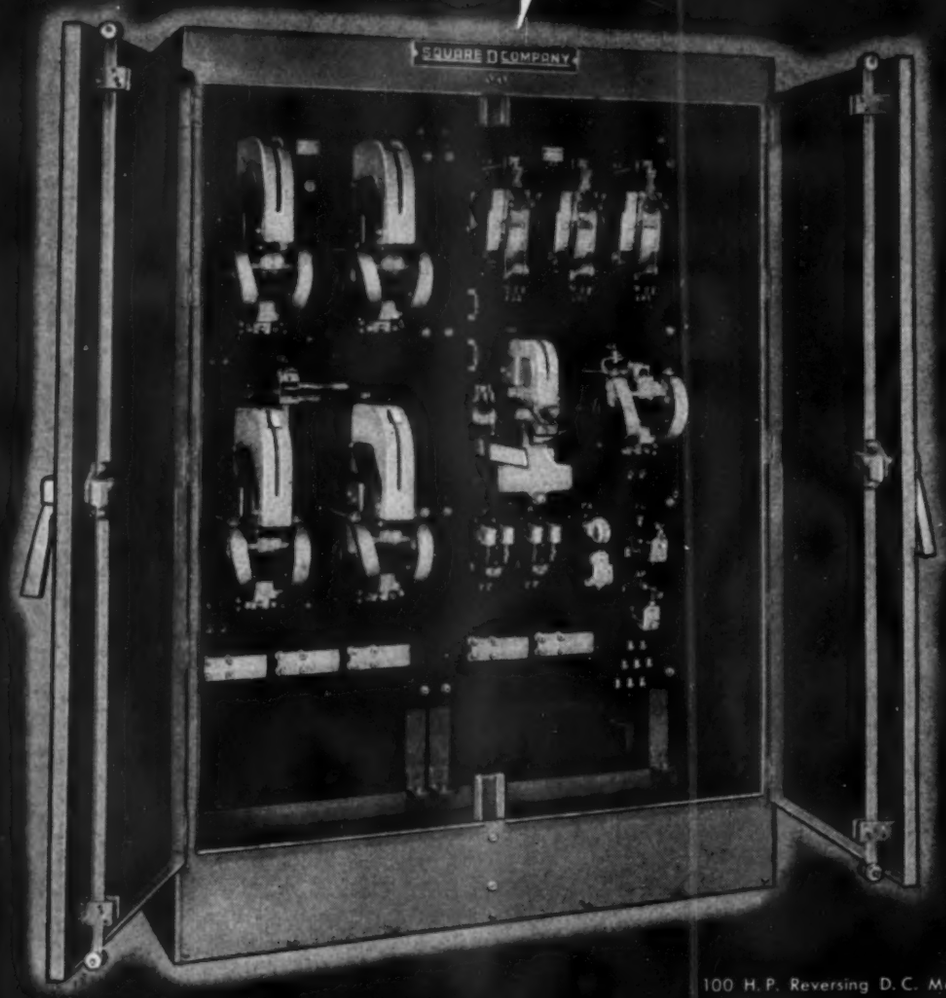
Less machine down-time and greater production efficiency is a problem facing all metal-working shops today. The experience reported by this manufacturer indicates results which can be obtained by installing **BARNESDRIL** Separators in connection with all Honing and Grinding operations. Easy to install, with low initial and maintenance cost, the Separator will help to boost productivity and hold costs down in your shop. Ask your **BARNESDRIL** Field Engineer for details on cost, capacity and ease of installation.

Write for complete data on the Magnetic-Automatic Coolant Separator. Ask for Bulletin B-1514.

BARNES DRILL CO.

830 CHESTNUT STREET ROCKFORD, ILLINOIS U.S.A.

Performance Plus



100 H. P. Reversing D. C. Magnetic Starter for Adjustable Speed Motor

with SQUARE D D.C. Motor Control

Generous wiring space and accessible terminals for fast installation. Simplicity of construction for easy inspection and maintenance. Appearance that reflects sound engineering and functional design. These are the things which this D.C. motor control offers. Of equal importance, Square D offers a *complete* line—one which blankets the requirements of industry up to and including heavy duty control for mill auxiliaries.

Wherever electricity is distributed or controlled

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

THEY EXPRESS *Preference*

"We are aided by the speed and ease of operation of these machines." "We prefer Cincinnati Bickford Super Service Radial Drills." So say the operators of a prominent machine tool manufacturer.

Eleven holes, from $\frac{5}{16}$" to 1¼", were being drilled to depth, and tapped to depth, in this 6x4x4-ft. casting.

They tell us the range of speeds and feeds of Cincinnati Bickford Super Service Radial Drills, and their performance, are such that they are preferred.

Write for detailed Bulletin R-24A.

Equal Efficiency of Every Unit Makes the Balanced Machine

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

See our condensed catalog in Sweet's File.

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.

DANLY

1 RUGGED CONSTRUCTION

All-steel, Danlyweld Construction. Intermediate continuous structural members extend up through the back of the frame, reducing deflection throughout the entire length of the bed.

2 MECHANICAL ACCURACY

2 Suspension Points—Eccentric Gear Drive —Extra-long, fully adjustable gibs.

3 PRESSURE OIL SPRAY LUBRICATION

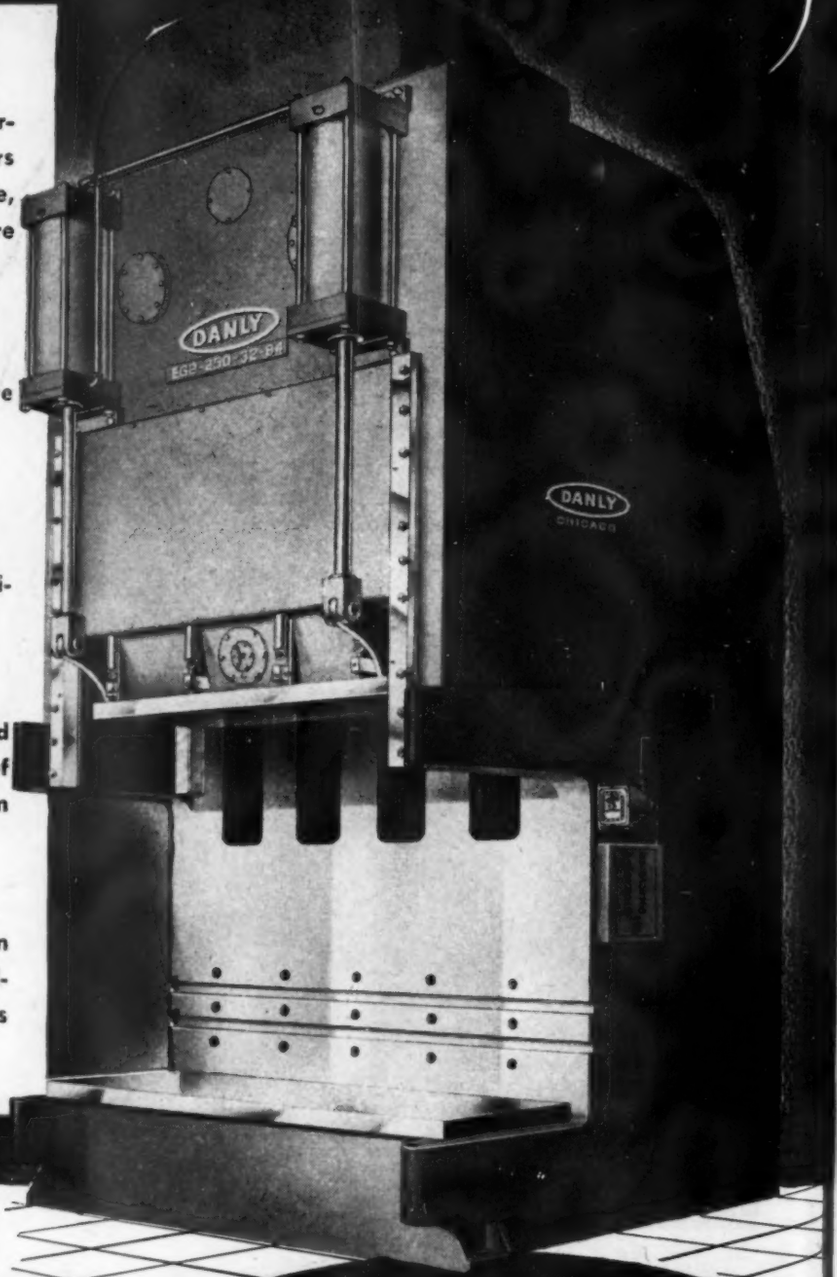
All gears and internal moving parts lubricated in a spray of filtered oil.

4 AIR-FRICTION CLUTCH

Solenoid controlled—provides smooth and fast engagement and disengagement of driving machinery without delay for cam rotation.

5 MODERN DESIGN FEATURES

Electric Stroke Indicator and Push-button Control Panel—Motor-Driven Stroke Adjustment are standard equipment on this model.



The 250 ton, 2 point Eccentric Gear Gap-Frame Press shown is of all-steel Danlyweld construction. Gearing and driving members are completely enclosed within the frame. This press has a 14" stroke—operates at 20 strokes per minute. Bed area is 32" x 84". Shut height—54".

THE PRESS for MODERN PRODUCTION

DANLY MACHINE SPECIALTIES, INC., 2100 South 52nd Avenue Chicago 50, Illinois

American Machinist's Spot NEWS OF METALWORKING

Deliveries of production equipment are being quoted to a large metalworking manufacturer on the following basis: knee-type millers, 1-3 weeks; manufacturing lathes, 10-14 weeks; toolroom lathes, 8 weeks; radial drills, 3-6 weeks; sensitive drills, 10-12 weeks; turret lathes, 2-3 months; punch presses, shears, press brakes, 10-12 months; planers and other big machine tools, 12 months; conveyors and electric trucks, 8-10 months; and cranes, 9-12 months.

Wage increases of 5-15 cents per hour have been granted by considerable number of metalworking companies, though U. S. Steel and United Steel Workers have not yet reached agreement. Officials say that new contracts already signed form pattern which may hold for second round of increases.

Over and beyond hourly rate increase, steel union has made these demands on some steel mills: Monday-Friday work-week with overtime beyond; denial of management's right to set work schedules; tight limitations on management's right to change rates for changed jobs; increased report pay allowance; elimination of foremen from grievance procedure; seniority only factor in promotion; 4-8 weeks' severance pay; pensions and insurance paid by company; 40-weeks-a-year pay.

Possibility of light Chevrolet for 1948 model run seems dispelled by new postponement of building and tooling programs for new plant at Cleveland. Active work on light-car program, however, as distinguished from go-aheads on engineering development, is indicated for this summer, with probability that preparatory work will be completed in mid-1948.

> New machine tool surplus policy probably will be put into effect about July 1. Attempt will be made to wind up surplus sales within few months after that date, with large numbers of unwanted tools likely to be scrapped. Worrisome factor is whether public will accept junking of machine tools as they do obsolete bombers.

Farm tractors are being used as power plants in Britain's metalworking plants during fuel crisis. Forge shop in West Bromwich is employing a Fordson to run its 1000-lb. hammers. Birmingham maker of small component parts is utilizing two tractors to operate 35 machines, and an east London machine shop is running on two tractors. Large company producing plastic components expects to keep 400 people busy, running plant on eight tractors.

German machine tools brought to this country by the War Department are to be put on display shortly at the Frankford Arsenal at Philadelphia. Tool builders will be invited to inspect them.

First Mexican plant to produce automobile and aviation engines has begun operations at Balbuena, on the outskirts of Mexico City.

Encouragement to two-year labor contracts has been given by National Labor Relations Board in new policy decision involving Reed Roller Bit Co., Houston, Tex. NLRB is abandoning practice of allowing rival union, after one year, to challenge established union's right to contract.

German machine tool builders in Soviet zone have produced in past year far in excess of output quota allocated to them under Potsdam agreement. This is clear indication that Soviet government has encouraged such production, taking machines for rehabilitation of Russian industries.

(Further news on pages 148A-160)

EFFECTIVE LUBRICATION ASSURES

Increased Output Improved Finish Longer Tool Life

• In hobbing, for example, users of Texaco Cutting Coolants have reported increases in tool life ranging from 30% to as much as 300%!

IT'S been proved time and again: *tools stay sharp longer with Texaco Cutting Coolants!* This means cleaner cuts and better finish, less downtime for tool changes . . . a higher output of top quality work.

Texaco Cutting, Soluble and Grinding Oils can help you machine faster and better, at lower cost, no matter what the tool or the metal. They cool as they lubricate, prevent chip welding, wheel loading, assure you more cuts per tool grind, with fewer rejects.

Enjoy these benefits on all your machining jobs. Get Texaco Products and Lubrication Engineering Service from the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO CUTTING, SOLUBLE AND GRINDING OILS FOR FASTER MACHINING

Tune in . . . TEXACO STAR THEATRE presents the NEW EDDIE BRACKEN SHOW every Sunday night. Metropolitan Opera broadcasts every Saturday afternoon.

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Research: Key to Our Future

In discussing national defense, a top military leader recently said that if the Army and Navy could be assured of $100 million a year for research, it would mean more to the nation than universal military training.

He remembered the Battle of Britain. The Nazi Luftwaffe swept down on the tight little island, but an outnumbered force of British Spitfires held them off. The Spitfires were faster, and could be more easily maneuvered than the German attackers. Superior design won the day.

Practical research is just as vital to industry as to national defense. A manufacturer cannot afford to be static if he is to be successful. He must constantly be on the search for improvement in his products and for new products which will outmode the old.

If he is smugly satisfied with what he has, he is apt to become the unsuspecting victim of an alert competitor.

Many companies do not need to be told these facts. They are keenly conscious that research is their life-blood, hence they are spending more money, have employed more men and have provided greater facilities for research than ever before.

We recall the manufacturer who has been pouring sizable sums into development of a machine which, if perfected, promises to revolutionize an industry. Several companies have produced metals which will withstand high temperatures never before approached. They thus have opened extensive new markets for themselves.

One could recite case after case of new products, new machines and new materials which have repaid many times the research and development cost. They have spelled the difference in numerous instances between a healthy or an anemic business, between industrial life or death.

Every progressive manufacturer, no matter how small, should heed the advice of the Research Committee of the New England Council to have at least one technically trained man on his staff.

This committee suggests further that perhaps it is time to consider placing men with technical training and experience on a company's board of directors. Modern top management must be able to evaluate scientific and technological advances. It must be aware of their potentialities for new raw materials, new processes, new methods and new markets.

This is the day of research, in industry as well as in national defense. The future of our industrial economy depends upon it. Wherever management thus far has not recognized this fact, it should revise its thinking accordingly.

Continuous and intensive research is the key to our future safety and prosperity. And that applies to individual companies as well as to all of us as a nation.

Burnham Finney

EDITOR

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

Big Bends

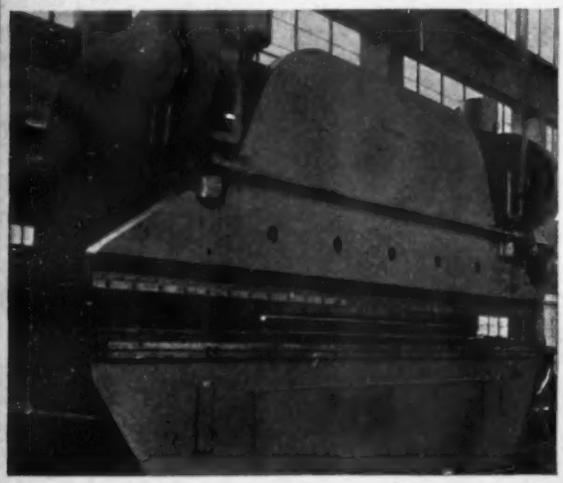
In the production of open cylindrical shells for pressure vessels and other containers, also heavy structural and machine members, 500 Series Cincinnati Press Brakes have the capacity for curving and bending these heavy plates.

Kinking the edge of heavy plate preliminary to rolling is another job where these large Cincinnati Press Brakes are effecting material savings.

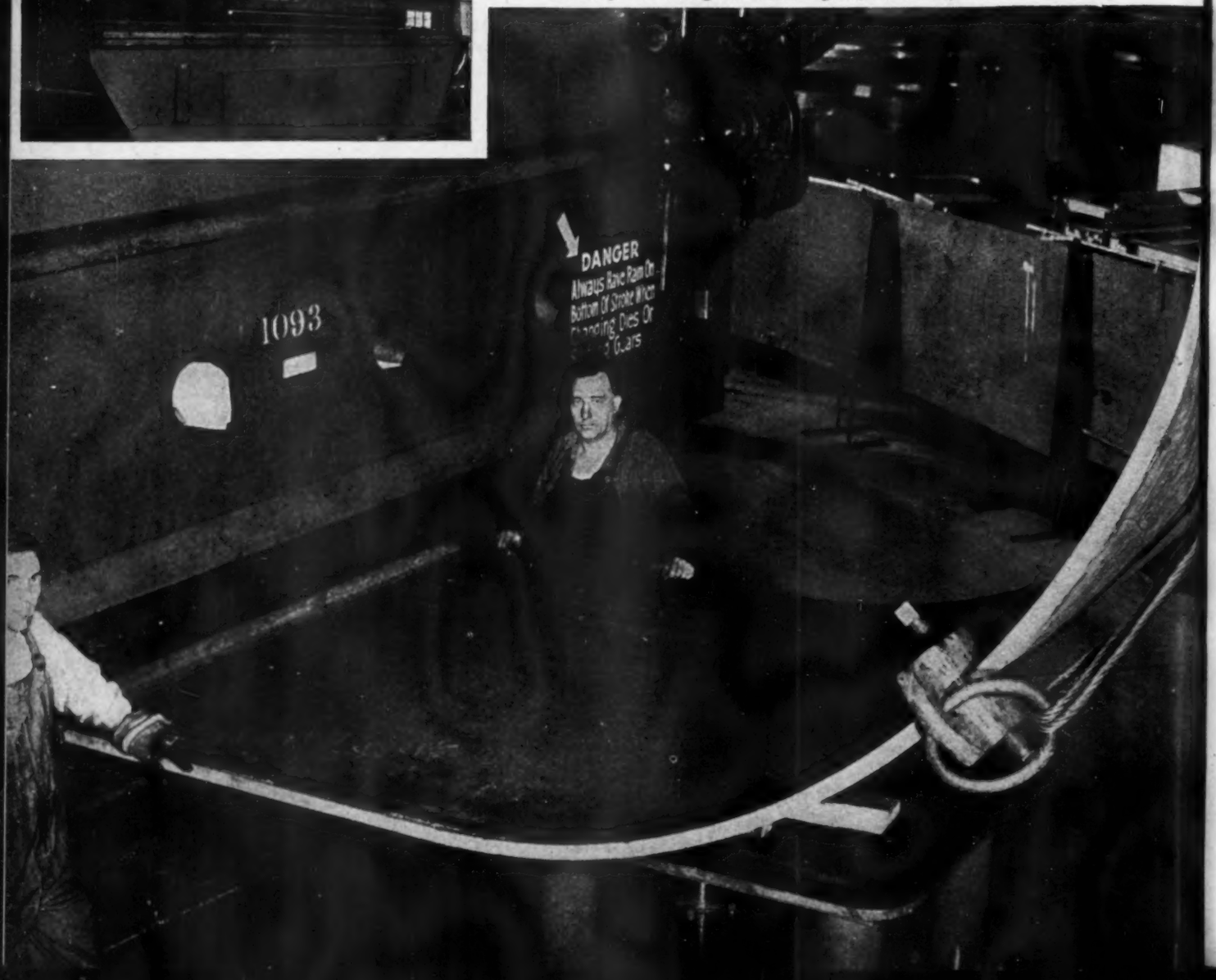
If you have a "heavy plate" problem, the capacity, power and performance of a 500 Series Cincinnati Press Brake may solve it for you.

Write for engineering recommendations and Catalog B-2.

This 500 Series Cincinnati Press Brake has over twenty feet clearance between housings. Capacities: Twenty-five feet of ¾" plate or shorter lengths of 1½" plate as shown below.



Courtesy of Nordberg Manufacturing Co., Milwaukee, Wis.



Thread Forming in Thin Metal

Threads, beads and knurls can be formed successfully in thin stock, but the tools demand special design considerations

BY WALLACE C. MILLS

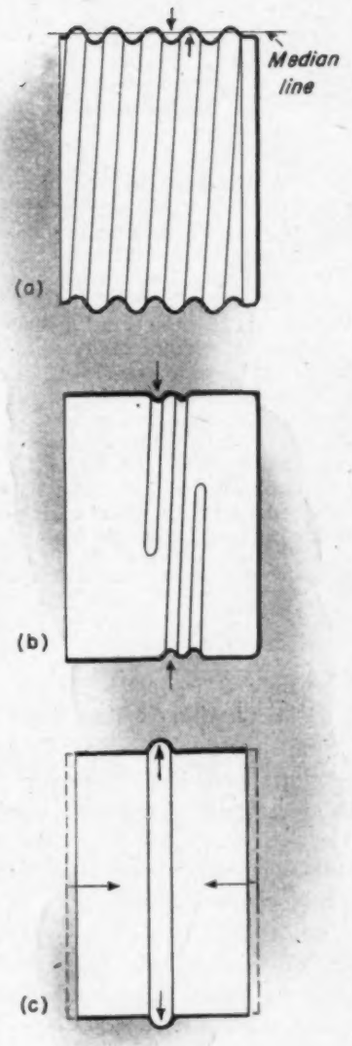
A COMMON PROBLEM is forming of threads in thin-metal cups and tubes, such as bottle caps and hose couplings. Tool designers and toolmakers have gone far toward its solution. But all too often, kinks developed by toolmakers are lost for general use, because as one toolmaker said, "When I get it, I'm so happy I forget it. Anyway, what works in one case doesn't always work in another."

That is especially true in working thin stock, under 0.020 in. in thickness, because, unless conditions are almost exactly the same, results will not be the same. Rolling near the open end of a cup, for example, requires different corrections in rollers than rolling near the closed and, rolling two beads simultaneously produces different effects than does rolling one bead at a time, and rolling hard changes the forming action. Even rolling in different machines with the same tools may produce parts that differ.

But a knowledge of basic principles underlying the forming of beads, threads and knurls permits design of efficient, economical rolling and squeezing tools. Rolling tools here described are applicable to any rolling machine that has spindles geared together and a means for bringing rollers together.

It may be a hand-fed semiautotomatic beading machine with power-driven rollers, cam, and stripping mechanism or a fully automatic screw machine with chute feed. Several such machines may be connected together by conveyors, with the stamping blown by compressed air through a chute leading from stamping to the first machine.

Although rolled threads are more common on seamless shells than squeezed threads, the latter are customary on lock-seamed tubes because of the difficulty of rolling over a seam. Both squeezed threads and beads may be formed in can bodymakers with special attachments, in special machines or in press dies equipped with automatic feeds.



Rolling Principles.. The same rolling principles apply to threads, beads and knurls as threads and knurls are forms of beads. The first principle is that the metal as in (*a*) tends to roll inward and outward from a median line. By stretching the metal in dies or rollers, it can be forced entirely inside, as in (*b*), or outside of the shell periphery if the thread is fine. Rolling inward and outward from the median is shown by the inward groove of a coarse inward thread bounded by slight outward ridges. This may be overcome in threads of about 12 per in. by rolling hard. A third principle is that metal, as in (*c*), tends to draw from both sides toward the bead

TOOLING PRACTICE FOR SQUEEZING TOOLS

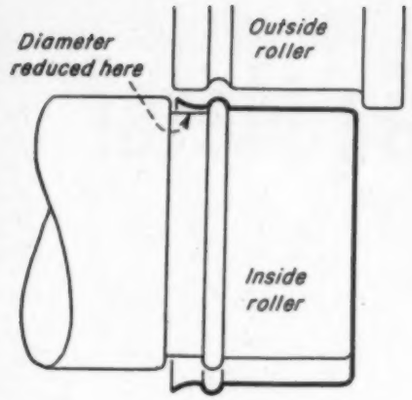
1. *To avoid splitting the work, squeezing tools should be designed so the outside expanding jaws move inward to support the work before the inside jaws expand. This rule applies particularly to drawn seamless shells.*

2. *Tools and machines must be rigid.*

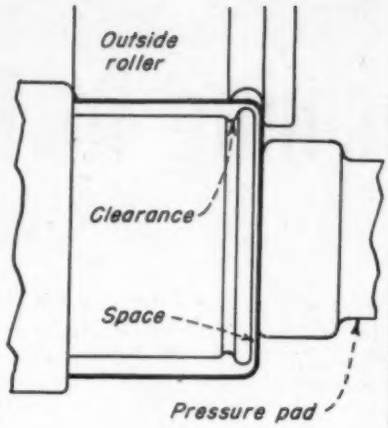
3. *Clearance should be provided at the bottom of threads to avoid undue strain on expander parts.*

4. *The metal, wherever possible, should pull from both sides of a bead toward the bead. A space should be provided between tool and closed end of shell, so the metal may draw from the closed end as well as the open end.*

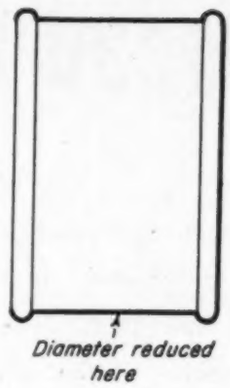
5. *As end pressure on the shell helps the forming action, the tools should be designed for such application whenever the pressure can be applied conveniently.*



Open - end Beads . . Flow of metal near the open end of a shell is more free than near the middle or closed end and deep indentations, beads and threads may be formed without tearing of stock. The metal can pull from one direction only, resulting in the stock flaring outward. Making the inside roller smaller and the outside roller larger presses the metal in at the open end but the final shell is barrel shaped. As metal draws freely from the open end, screws caps should be designed so the threads start a short distance from the open end to avoid distortion



Closed - end Beads . . Beading near the bottom stretches the metal because there is more resistance to drawing from the open end. The metal should be allowed to draw from both directions toward the bead. The shell may be longer than the roller and the bead started at a short distance from the bottom, surplus stock may be provided in the closed end in form of a panel or the pressure pad may press lightly against the shell



Double Beads . . Rolling two beads at once draws metal in one direction only, stretches it between beads and reduces shell diameter by as much as 0.020 in. on a 1⅝-in. shell of 0.010-in. stock. In thread rolling, the metal acts the same way as threads are really a series of beads rolled simultaneously. To determine the allowance in reduction of diameter, roll a thread on a trial shell made on temporary tools and make the permanent tools that much larger

TOOLING PRACTICE FOR THREAD ROLLERS

1. Standard dimensions have been established by the Glass Container Association for threads of glass bottles and jars. Screw-cap thread rollers should be designed to agree to these standards.

2. Built-up piece construction permits alteration and replacement for wear.

3. The inside roller is made first if the thread fits on the inside, as on a screw cap. The outside roller is made to fit the inside roller.

4. The inside roller is made as large as possible, but small enough to permit stripping of threaded shell. The outside roller has usually the same diameter as the inside roller, but may be two or three times as large. No allowance for difference in diameter of work and roller is made in the thread lead on the roller, although the formed thread is not perfect because the rollers make more than one revolution to complete one formed thread.

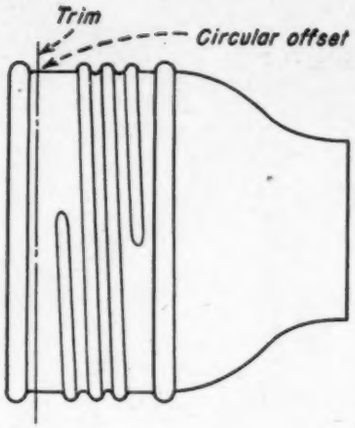
5. Rollers are geared together with only the outside knurling roller revolving freely. The outside roller should advance rapidly until it touches the shell, then slowly while forming the thread and dwell after the thread is rolled full depth. Advance and dwell are controlled by a cam. The rollers should remain in contact for 1⅛ revolutions for rough work and 2 or more for high-quality work. Strain-hardened metal may be thread-rolled by advancing outside roller to one-half depth with dwell and then rolling full depth.

6. Small changes in diameter, 0.002 to 0.004 in., for fit may be made by rolling hard so the metal is rolled thinner, or the inside diameter of a thread may be made larger by separating rollers. Larger changes are made by stamping the cup to a larger diameter.

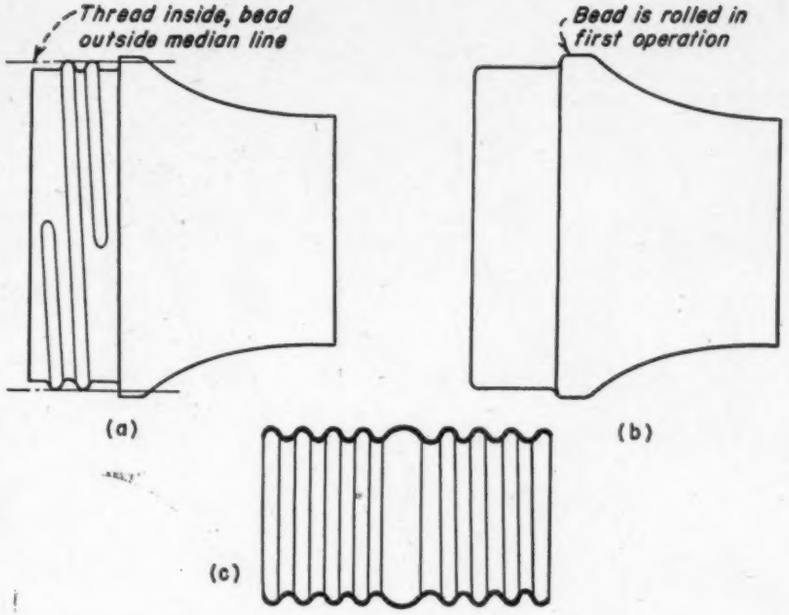
7. Thread depth may be increased by applying pressure to the closed end of the cup.

8. When a threaded cup is to have a centerblanked hole in the bottom, tools should be designed so blanking follows threading in order to avoid distortion of the hole.

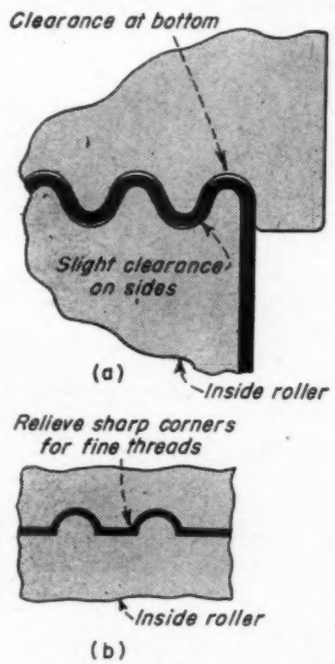
9. Satisfactory roller material is oil-hardening tool steel, hardened to Rockwell 60C.



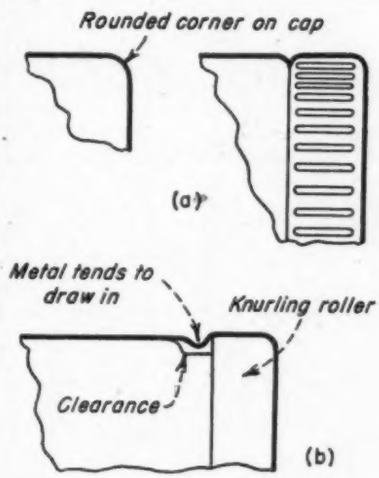
Offset Threaded Shell.. The effect of rolling two beads simultaneously can be applied with advantage to threading a flashlight hood with a truly circular offset. The extension is for a circular fiber gasket. If the thread and offset were rolled at the same time, the offset would be distorted. Rolling the beads and thread in one operation and trimming off outer bead in second operation produces more accurate offset



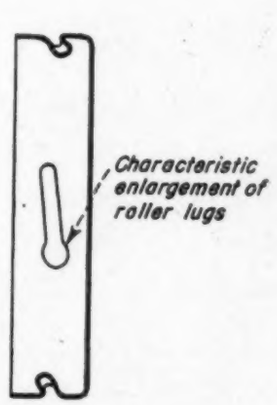
Double-operation Jobs.. Two operations are required to roll the flashlight hood in (*a*). The large bead is outside the median line and the thread entirely inside. The bead is first rolled, as in (*b*), and the thread rolled in a separate operation. The hose coupling in (*c*) can be rolled in two similar operations. If the threads were of different diameters, separate threading operation would be necessary as the rollers are geared together and their peripheral speed for two diameters is not the same



Form of Thread Rollers.. Roller threads are made deeper than threads on finished parts to allow for springback, clearance being provided in the thread grooves. Clearance should be gradual as in (*a*), not square cornered, and should extend around the thread for some distance, the rollers being held apart by spindle spacing collars. For fine threads (*b*) and for threads rolled hard, sharp corners should be relieved to avoid tearing the stock

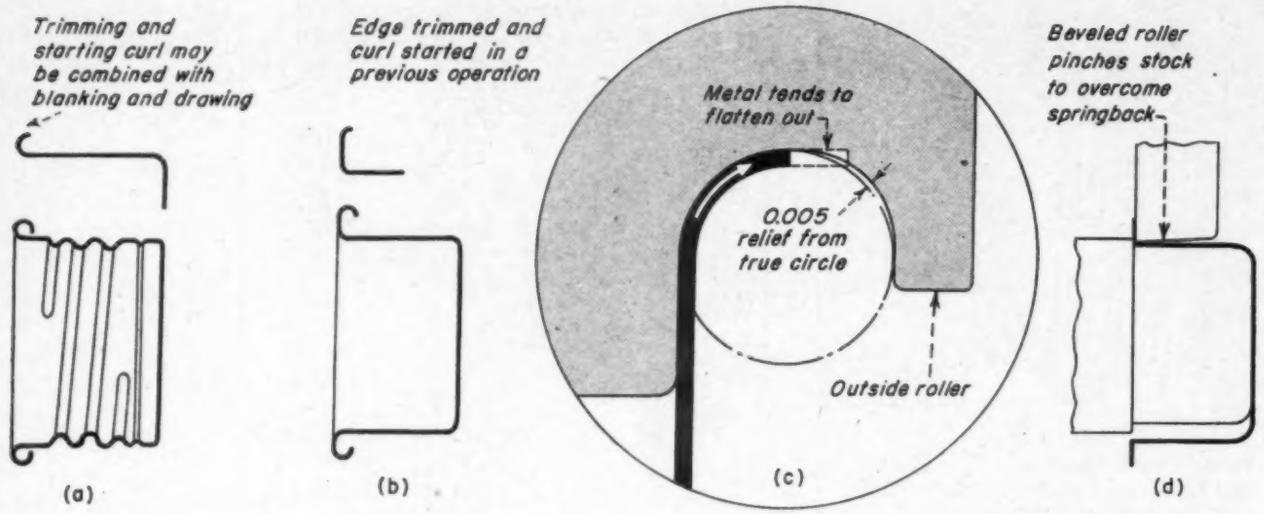


Rolling Knurls.. Better appearing knurls are made by rounding the corners of a cap before rolling, as in (*a*), and providing a clearance, as in (*b*), to allow metal to roll in and out from the median with less stretching. Knurls prominent on one side and shallow on the other may be caused by wear of rollers, out-of-line spindles or too few revolutions as limited by revolutions for threading. Over-lapping knurls can be prevented by balancing diameters of threading and knurling rollers mounted on same spindle so both roll properly at same time

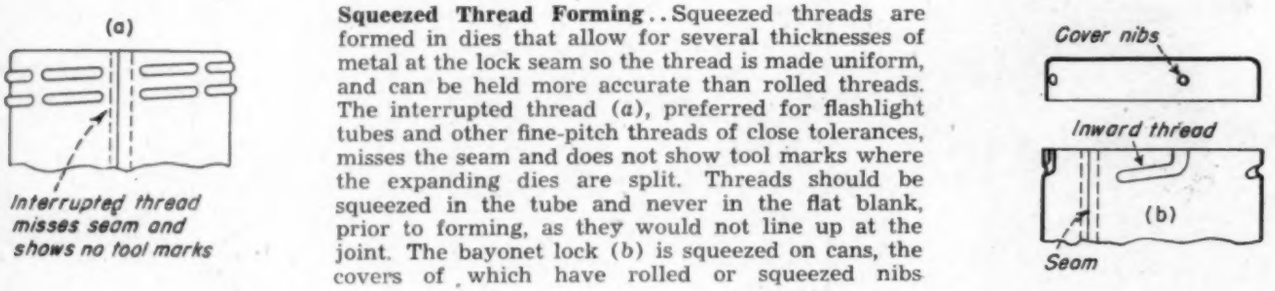


Rolling Lug Caps.. Lug rolling applies the same principles as thread rolling. Improperly mated rollers or rollers not revolving in contact during entire forming operation will make lugs deeper at one end. Four lugs are easily rolled by making a 3-lugged inside roller three-fourths the diameter of the work and rolling for 1 1/3 revolutions

NEXT PAGE PLEASE


Trimming and starting curl may be combined with blanking and drawing
Edge trimmed and curl started in a previous operation
Metal tends to flatten out
0.005 relief from true circle
Outside roller
Beveled roller pinches stock to overcome springback
(a)
(b)
(c)
(d)

Curled Threaded Caps.. Bottle caps may be made in one or more operations. A shallow cap with a narrow flange, as in (*a*), may be curled, threaded and knurled in one operation from a cup with an untrimmed flange. A deep cap should be trimmed and the curl started in the previous operation because of irregularity of the edge from drawing. Wide flanges (*b*) should always be edge-conditioned as they receive little support from the cup body. Narrow flanges of thin metal may be curled in one operation, but thick stock digs into the roller unless the curl has been started. The curling groove in the outside roller (c) should be relieved 0.005 in. to reduce metal strain and wrinkling. Before curling, a sharp corner, if required, can be set, as in (*d*), by rolling hard with a beveled outside roller to prevent springback



Squeezed Thread Forming.. Squeezed threads are formed in dies that allow for several thicknesses of metal at the lock seam so the thread is made uniform, and can be held more accurate than rolled threads. The interrupted thread (*a*), preferred for flashlight tubes and other fine-pitch threads of close tolerances, misses the seam and does not show tool marks where the expanding dies are split. Threads should be squeezed in the tube and never in the flat blank, prior to forming, as they would not line up at the joint. The bayonet lock (*b*) is squeezed on cans, the covers of which have rolled or squeezed nibs

SEEN and HEARD

By JOHN R. GODFREY

What's In It?

An interesting controversy is going on between users and makers of small tools such as drills, taps, reamers and other cutting tools. Users want makers to mark tools to show whether they are made of 18-4-1 tungsten or one of the numerous molybdenum steels. Makers object to this marking, arguing that if tools perform satisfactorily, why bother about the steel used in making them.

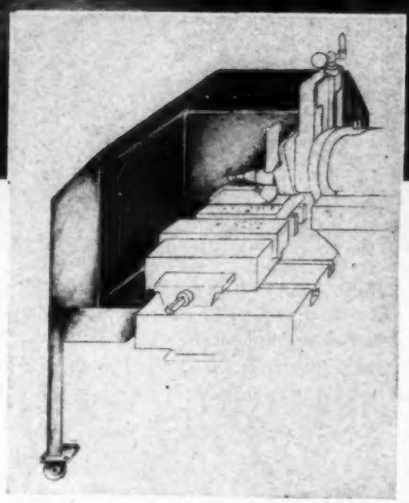
This has a plausible sound except for two points: It seems reasonable for a buyer to want to know what he is buying, even if it does good work. Also, when the tool comes to the scrapping point, it is money in the user's pocket if he can assure the junk man of the kind of steel and so get a better price for it. The user isn't trying to dictate to the maker the steel he should use, but he does want to know what he is buying.

Standard Chamfers

A CORRESPONDENT who is becoming "standard conscious" wants to know if we have any standards for chamfering the ends of bars or the edges of flat surfaces. He evidently has in mind the undesirability of sharp or "razor"edges sometimes left on work that has been machined.

Both for the sake of appearance and to prevent injury to workers, no really sharp corners should be left on work surfaces. We used to make it a practice to "break" the corner with a fairly smooth file, but never thought of measuring or putting any dimensions on the corners. Drawings often said "break corners," and we all knew what it meant.

Nicely rounded corners add to the appearance of most work, but in most cases it seems unnecessary to dimension them. For appearance sake they should be fairly uniform. So it may not be a bad idea to suggest pleasing radii or bevels for work of different sizes—with wide tolerances.



SHAPER CHIP CATCHER..Welded sheet metal forms a right-angle back stop for chips which fall into the bottom tray, from which they may be scraped up the sloping side into tote pans. Three castered angle-iron legs are welded on to complete the assembly—which is in constant use because it is safe, portable and convenient

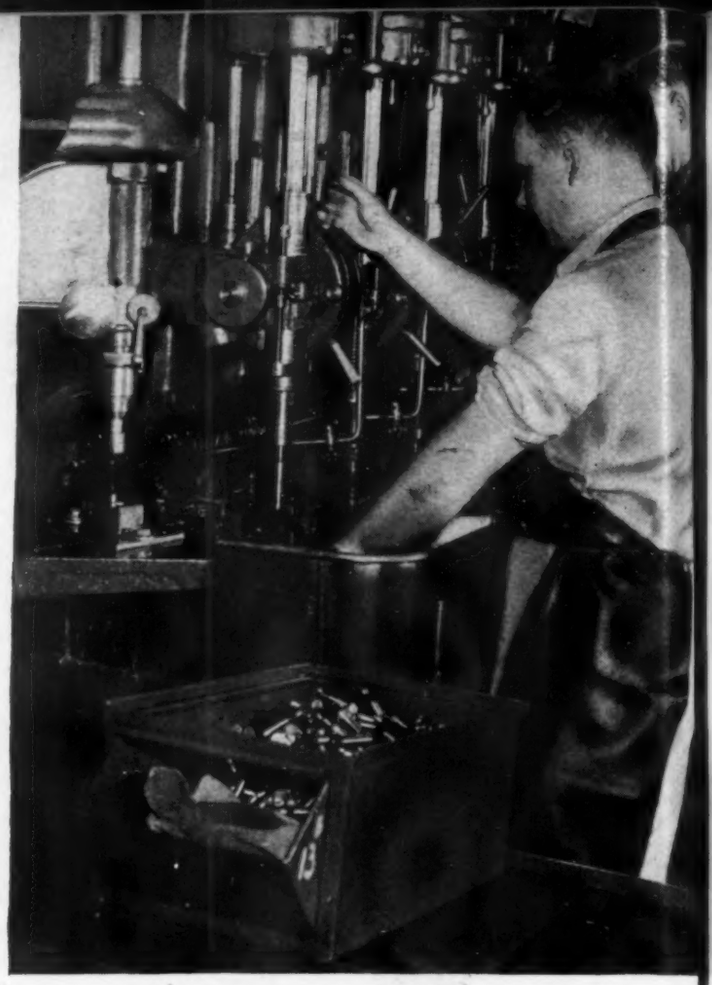
FOR GOOD PLANTKEEPING

AT VULCAN TOOL COMPANY

PRIDE OF POSSESSION..White block capital letters on a black background identify the toolmaker at each bench, make it and its appearance his responsibility. As a result, benches are neat and orderly. Gummed, paper letters on black pasteboard are slipped into a cellophane slide. All plant equipment, including benches, is painted light green, with orange on moving parts of machines and on cranes. The plant is in Dayton, Ohio

Air Fixtures SPEED HOLLOW MILLING

BY KENNETH F. BROOKS
MASTER MECHANIC, NINETEEN HUNDRED CORPORATION



This four-spindle Leland-Gifford power-feed drillpress hollow-mills two ends of a small malleable-iron casting. One operator mills long ends on three spindles, the second mills short ends at the fourth and chamfers the short end in the adjacent single-spindle machine

Air operation of this clamping fixture is controlled by a foot valve under the drillpress table. Operator is loading a piece into the clamp jaws. Clamp cylinder is at upper right. Production averages 200 pieces per hour

Washing-machine wringer eccentric has ends finished on drillpress at 200 finished pieces per hour. Pneumatic fixtures avoid difficult lathe-chucking operation

BOTH ENDS of a 2 11/16-in. long malleable-iron wringer eccentric used in domestic washing machines by Nineteen Hundred Corporation must be turned to 0.500-in. dia. Axes of the two sections are parallel and must be 0.375 in. apart. The short end of the eccentric is 13/32 in. long, the long end is turned for 1 13/32 in.

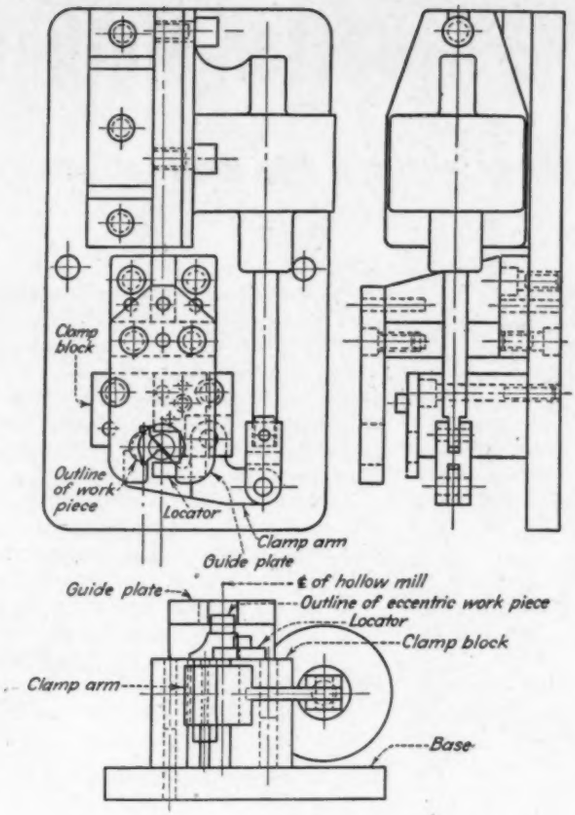
Chucking these parts for lathe turning would be difficult, so fixtures have been developed to permit hollow milling in a standard sensitive drillpress. To minimize setup time, air-operated clamping fixtures are used.

Hollow milling the short end is a little more than three times as fast as on the long end. Therefore, one operator handles three of the four spindles to mill long ends; the second operator mills short ends and chamfers short ends in the second machine.

The four-fluted H.S.S. cutters for the long ends are 1½ in. in dia. Each cutter is guided in a hardened steel bushing supported in the top plate of its workholding fixture. The H.S.S. cutter for the short end has five flutes and is only 1 in. in dia. It does not require a hardened guide bushing and is guided in a 0.9690-0.9695 in. dia. hole in the top guide plate of its fixture.

Spindle speed of 300 rpm. and feed of 0.006 in. per rev. is used on the long ends. Spindle speed is increased to 450 rpm., with the same feed for the short end. Sulphur-base cutting oil is flooded over all four fixtures.

The fixture for short-end milling is shown. Basically, design of the fixture for the long end is the same, except that the top guide plate is farther from the clamps, and it is arranged to carry a 1½-in. I. D.



Finished long end of eccentric casting is held in V grooves in the clamp block and clamp arm when the short end is positioned under the cutter spindle. A cut-out locator plate bolted to the top of the clamp block aligns the small end of the piece with the cutter. Guide plate and air cylinder are supported on welded-steel brackets on the baseplate

guide bushing. Clamping is effected with a No. H-4 Mead air cylinder with an extended piston rod machined to fit a double-yoke toggle, which, in turn, is connected to the outer end of the clamp arm. This arm is tool steel, hardened and ground. It is fitted into a horizontal slot in the hardened tool steel clamp block, where it is held in place by a ⅜-in. vertical pin. The clamp arm is rotated about this pin when the air cylinder is operated.

On top of the clamp block is bolted and dowelled a hardened and ground locator having an opening into which the eccentric fits when properly positioned in the clamp groove. The locator plate is 2 3/16 in. long, 1⅛ in. wide and ¼ in. thick. The clamp block is 2 5/16 in. high, so the top guide plate (supported over the clamp block on a welded bracket) clears the baseplate by 3 in. The air cylinder is also mounted on a welded-steel bracket bolted to the 11/16x6x8-in. baseplate, which in turn is clamped to the drillpress table. Only clamp arm, block, locator, dowels and screws are tool steel.

TIPS for Top Shop Men

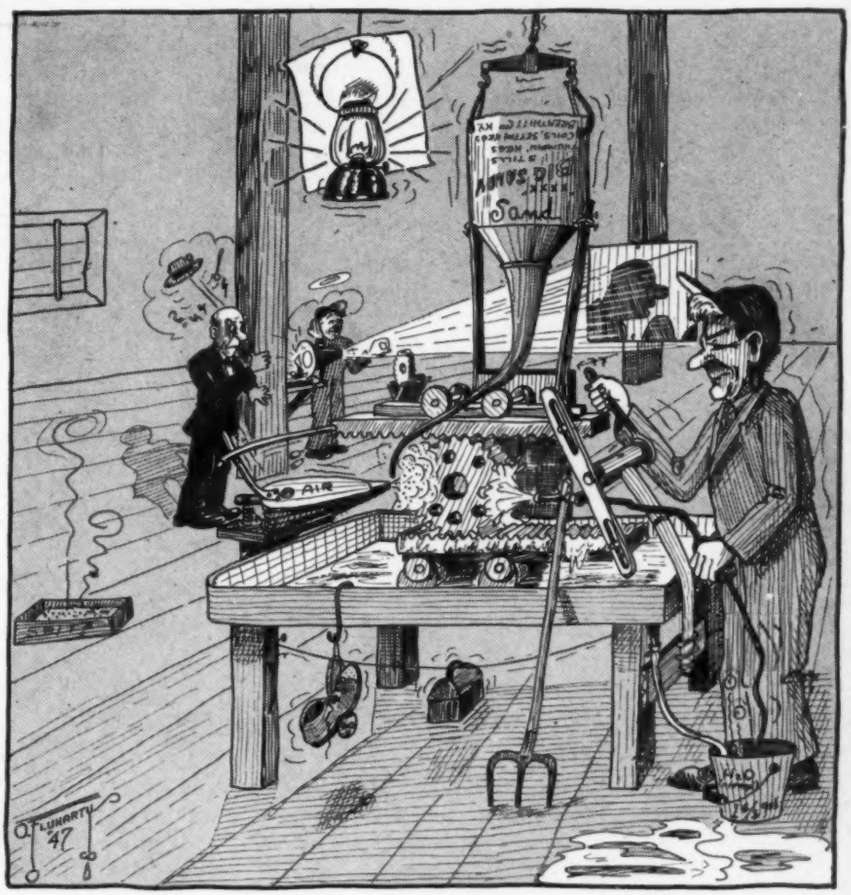
160 Jog the suggestion plan every so often. It will stagnate if you don't give it an occasional push, because it becomes as familiar as meals and taxes. Remember, an active suggestion plan saves company money while it helps worker morale.

161 Build enthusiasm and company pride. Men proud of their work are proud of themselves. An essential in morale is worker pride in himself and in his job.

162 Never forget routing, storing and identification, even if you don't feel like a traffic cop. Materials and parts placed and handled conveniently save trouble, ready identification saves time and scrap.

163 One theory is that horseplay results from an unrecognized worker's effort to get the spotlight for a minute or two. It seems to be borne out by the fact that in plants where men get due credit, horseplay drops to a minimum. Start your own safety campaign by remembering the pat on the back is better than the slap in the face.

OUR SHOP...20 *Gear Finishing Dept.*



Devised—A Better Method

Proper grinding technique saves time when either (a) setting

BY G. W. SHARP

TOOL ENGINEER, KENNAMETAL INC.
NEW YORK DISTRICT

SEVERAL ADVANTAGES accrue from grinding cutter blades individually after removal from the body and then resetting them, as compared with mounting the entire tool in a cutter grinder. These advantages are:

1. It is necessary only to clean up each blade, instead of grinding all blades down to suit the blade worn or chipped the most.
2. Tool angles are easily changed.
3. Blades of different grades of carbide and with different grinds can be used in the same cutter body when changes in material occur.

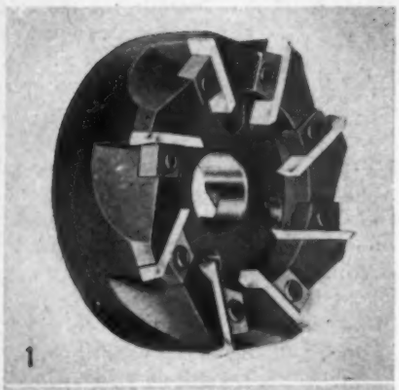
Cutter bodies from which blades are easily removed and then reset after grinding are shown in Figs. 1, 2 and 3. In the first example, solid carbide blades are wedged into a heat-treated alloy-steel body. The wedging is rigid and minute adjustments of the blades are easily made. The second tool is a steel disk with slots milled axially in the periphery. Various methods are used to wedge the square tools in place. Dimension *A*, Fig. 4, or the distance from the bottom of each slot to the center of cutter body, must be held accurately. Or, as in the third example, the slots can be broached in the cutter body and the blades locked with better support.

There are two proved methods for grinding cutter blades individually: (1) with a fixture that incorporates all of the necessary angles and is held by a magnetic chuck on a surface grinder, and (2) the use of a carbide tool grinder equipped with an adjustable table and protractor fixture. Details of the two methods are:

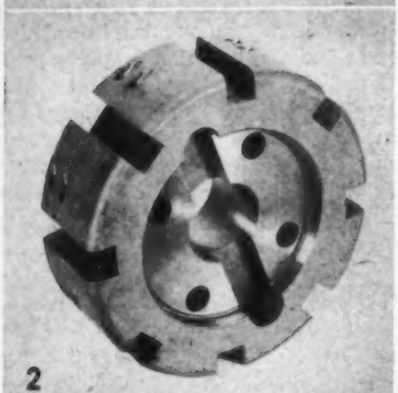
Use of Grinding Fixture

If chipped or cracked, the solid-carbide cutter blades should first be rough ground off-hand on a table grinder with the table set at 25°, which corresponds with the peripheral clearance angle. Then these four grinding steps are employed, using the fixture:

(*a*) With the fixture resting on face 1, Fig. 7, the peripheral relief land *Z*, Fig. 5, is ground. This angle,



1



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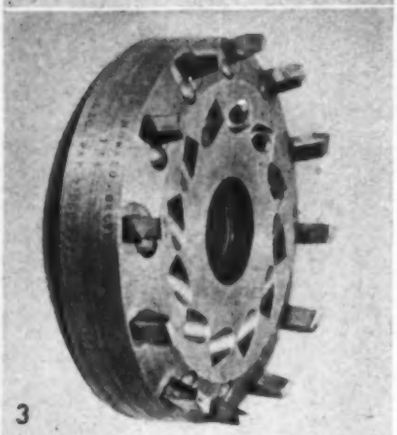
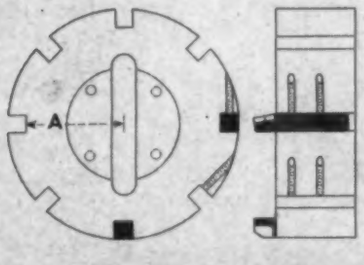


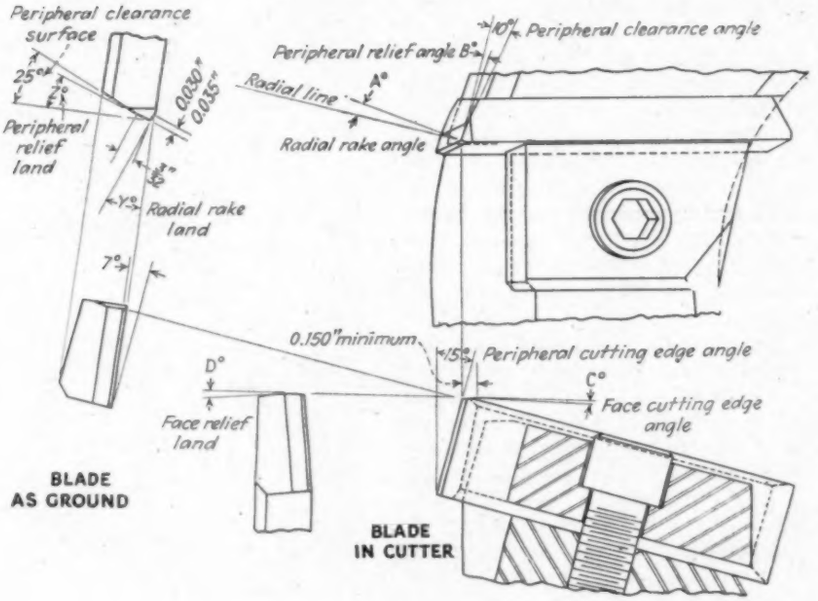
3

Cutter blades are easily removed from these three types of cutter bodies for grinding individually and then resetting accurately to the desired cutting periphery



4 Dimension A should be held to the required limits for periphery of assembled cutter

5 By grinding the solid carbide blade with the angles shown, the correct cutting angle, rake and relief are obtained when the blade is mounted in the cutter body



For Sharpening Carbide Face Mills

the blades by hand in the cutter on the machine, or (*b*) assembling the cutter in a fixture on bench

with the blade inserted in the cutter body, forms the peripheral relief angle *B*.

(*b*) The fixture is placed on face 2, Fig. 8, to grind the radial rake land *y*, which forms the radial rake angle *A*.

(*c*) With the fixture resting on face 3, Fig. 9, the tool is in position to grind the peripheral clearance surface at 25°, which forms the peripheral clearance angle of 10°.

(*d*) With the fixture resting on face 4, Fig. 10, the blade is in position for grinding the face relief land *D*, which forms the face cutting edge angle and the face relief angle when the blade is inserted in the cutter body.

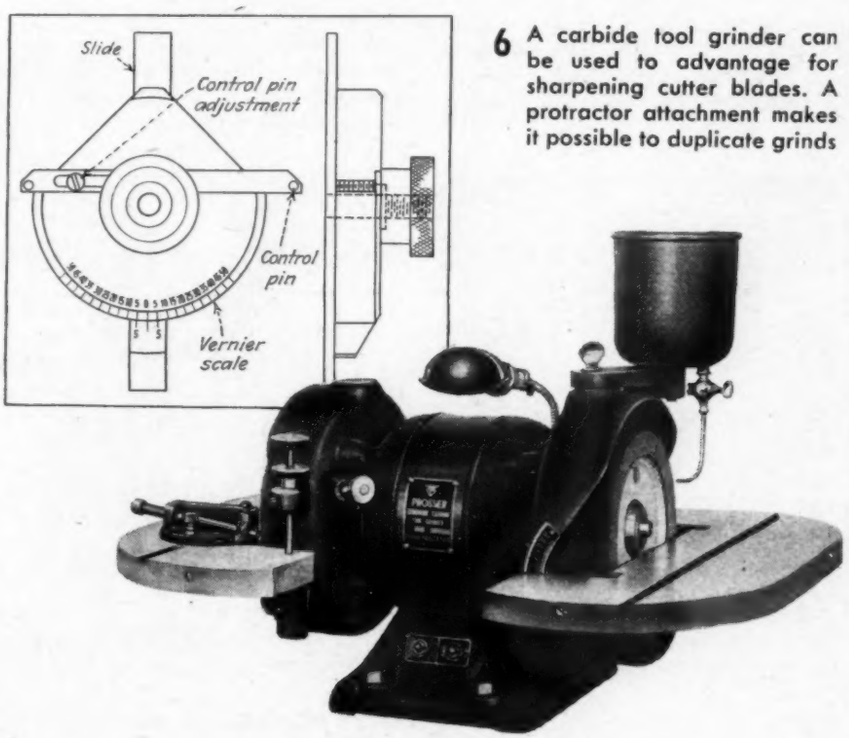
To insure that the finishing face of all blades be equidistant from the bottom, and hence in the same plane when inserted in the cutter body, it is essential that the last pass of the wheel in the setup shown in Fig. 10 be made with the grinder head precisely in the same vertical position. In other words, the same reading must apply on the dial of the leadscrew which actuates the wheel down feed.

This sequence of grinding cutter blades for cutters shown in Figs. 2 and 3 can be utilized by making a block which incorporates the desired angles and has a slot of suitable size and shape.

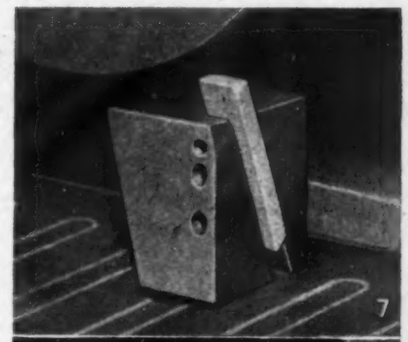
More Universal Method

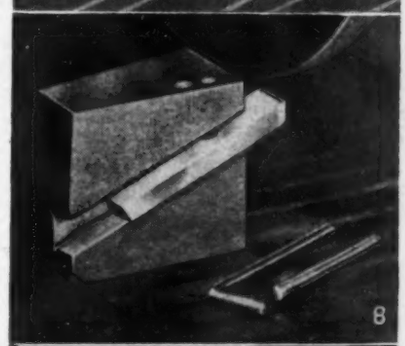
A carbide tool grinder with protractor fixture, Fig. 6, has more universal application because it can be used to grind tools for lathes and other machine tools, in addition to cutter blades. The solid-carbide blade is mounted radially in the cutter and the width of the blade forms the peripheral end-cutting edge angle. But the square blade with brazed carbide insert, as used in the cutter shown in Fig. 2, can be likened to a lathe tool. In this case the peripheral end cutting angle is on the long side of the blade, due to its axial setting, and is referred to as the side cutting edge angle, according to the nomenclature for single-point tools.

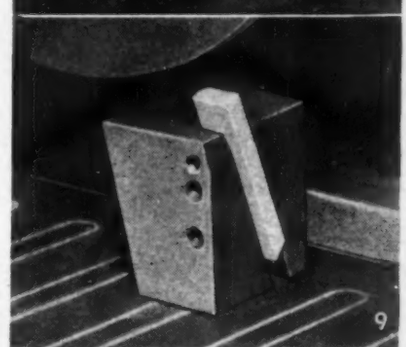
For the brazed-type blade, Fig. 11, dimension *A* is the most important, because it must be held to the accuracy desired on the face and periphery of the ready-to-use cutter.

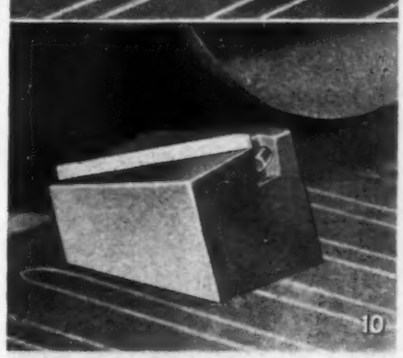


6 A carbide tool grinder can be used to advantage for sharpening cutter blades. A protractor attachment makes it possible to duplicate grinds









With these four setups of the fixture, solid carbide blades are rapidly sharpened on a surface grinder. In step 4, the down feed must always be identical

The protractor is set to the desired end cutting edge angle and the angle is ground as it would be on any single-point carbide tool, using the protractor guide.

The rakes are ground in the same manner. Finally, the side cutting edge angle, which is the important control dimension, is ground. As illustrated in Fig. 12, the blade is fed into the wheel and then across the wheel. The vernier graduations make it possible to grind to a precise angle by compensating. In other words, the setting made on the vernier scale may not coincide with the angles ground on the tool. However, the principal matter is the tool angle, and the vernier is useful to change any setting by a small part of a degree.

If the slot in the table does not run at right angles to the axis of the spindle, it may be necessary to finish the side cutting edge by anchoring the protractor fixture in a suitable position and feeding the blade up to the control pin and into the face of the grinding wheel. It should only be necessary to remove 0.001 to 0.002 in. Thus, wheel wear or heating of the tool will be negligible.

After the blades have been ground, it is necessary to devise a simple and accurate method of setting them into the head.

Fig. 13 illustrates a method of setting up the cutter on the milling machine. The left-hand view shows the cutter with one blade making a radial flycut in the workpiece, about half as deep called for in the finished job. The table is fed slowly by hand and the feed is then disengaged so that the cutter can be conveniently turned by hand. The face of the cutter and the workpiece are then separated about 0.010 in. Then each of the blades, including the loosened flycutter blade, is consecutively placed into the shoulder that has been fly cut, as shown at the right, Fig. 13.

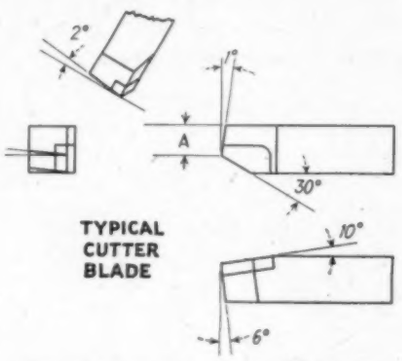
This method of hand setting, when the blades have been sharpened by the proper grinding technique, provides many advantages. It is rapid and reduces the down time of a machine. It compensates for any inaccuracy in the setup, since the cutter is fitted to existing conditions on the machine on which it is to be used. This insures a superior finish, since any slight run-out on the face becomes an asset, because one blade will inevitably be a thousandth or so higher than any of the others, and thus it acts as a clean-up blade to remove feed marks and produce a smoother finish.

This method is advantageous where continuous production is done, and it is desirable when large cutters are involved. It is generally preferred after a reasonable proficiency has been accomplished, since it is the most time-saving.

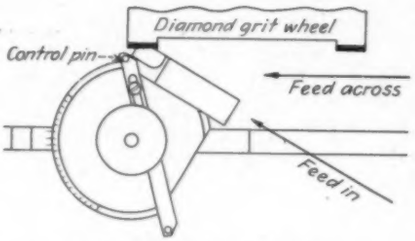
At times and for various reasons, it may be desirable to set the blades before mounting the cutter on the machine. A simple method is to set the cutter on a tapered arbor between centers on a lathe and to use an indicator on the toolpost, each blade being successively set. Basically, the only requirement is an arbor to locate the cutter and a method of holding an indicator.

Fig. 14 illustrates a fixture which facilitates setting of blades for the cutter shown in Fig. 1, eliminating cautious adjustments with an indicator. In this fixture a solid round bar of carbide is set tangential to the body of the cutter. The blade is inserted to a position slightly below center and with a slight wedging load applied to the blade. The body is turned on the arbor and consequently the blade is forced past the position on the round bar where it is at its closest position to the center of the cutter and is then set.

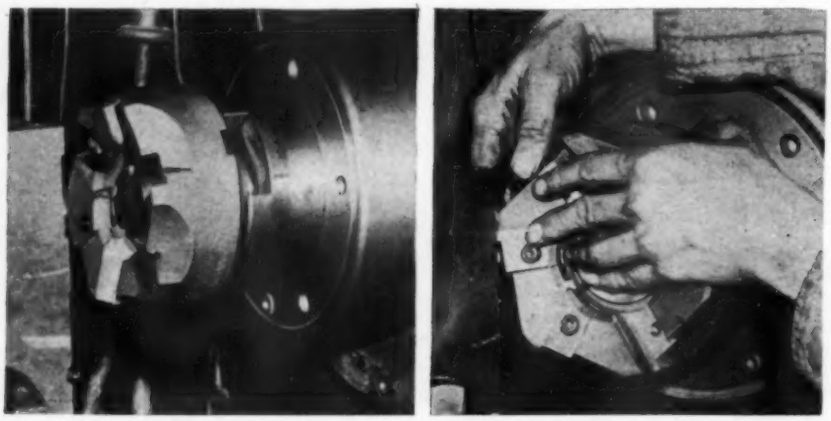
The cutter in Fig. 3 can be easily set up by simply dropping the tools onto any part of a surface that has been fly cut.



11 Dimension A must be held to the accuracy required on the face and periphery of the cutter

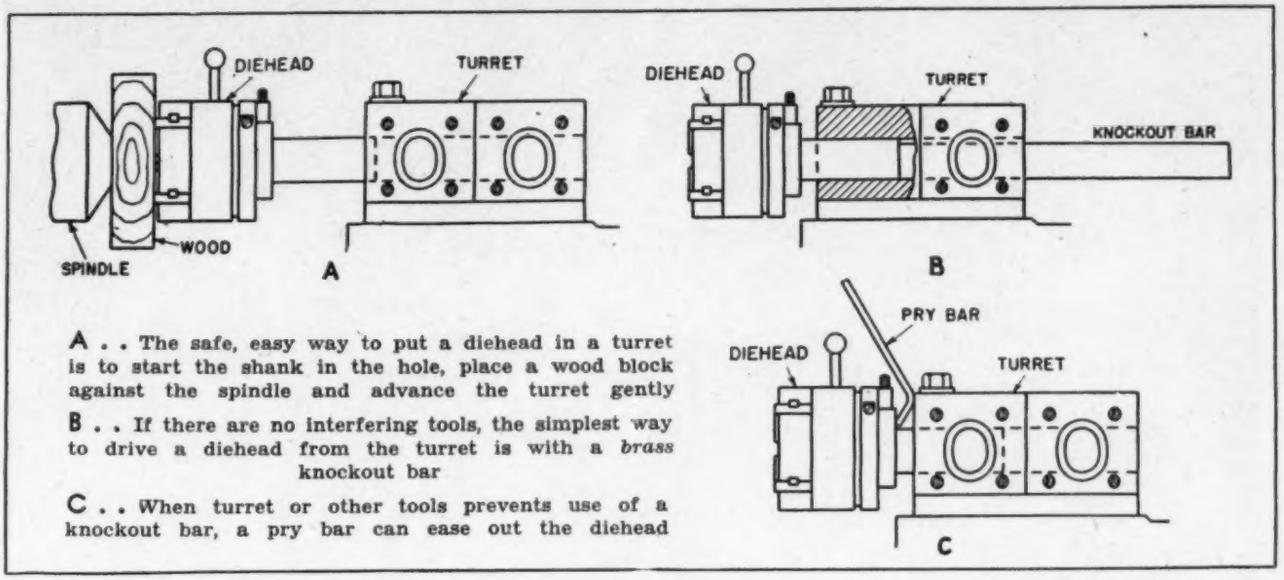


12 To grind the side cutting edge angle, the blade is fed into, then across the wheel



13 First a flycut (left) is taken with a single blade in the cutter body. Then, after separating the cutter from work by approximately 0.010 in., the blades are set (right) one at a time to the machined surface

14 Blades are set out to a solid carbide bar at the left rear of the special fixture



A . . The safe, easy way to put a diehead in a turret is to start the shank in the hole, place a wood block against the spindle and advance the turret gently

B . . If there are no interfering tools, the simplest way to drive a diehead from the turret is with a *brass* knockout bar

C . . When turret or other tools prevents use of a knockout bar, a pry bar can ease out the diehead

Coax, Don't Hammer

THE Geometric Tool Co., in the 1946 Fall issue of *Threads,* speaks up on mistreatment of dieheads. Some are so ill used, from being pounded in and out of turrets and mishandled in toolrooms, that they look like mallets themselves. Dieheads are precision tools—and should be treated as such. Here are points of importance:

When the binder screw comes down solid on the shank and mars it, flatten the shank and insert a brass shoe between screw and shank. When you take a tool from a turret, don't hammer. And be sure to wipe all chips and dust from the turret hole when you replace the diehead. Observing the simple ideas here illustrated will keep your dieheads accurate and in alignment.

But they should be used on machines in good condition. Machinists will often put a diehead on almost any machine, regardless of its condition, and expect it to produce accurate threads. They will run dieheads with a demand for good results under conditions that they would not think of tolerating in the comparatively simple operations of turning, forming, cutting-off or cylindrical grinding.

When diehead is in true alignment with the work, all chasers of a set contact the work at the same time and cutting is equally distributed among all chasers. But misalignment causes added burden on chasers bearing heaviest on the work, resulting in tapered, poorly formed threads and possible chaser breakage. Misalignment may be caused by worn ways at the forward end of the turret slide or a worn turret hole at the bottom forward end.

How About Standardizing Our Standards?

By DONALD A. BAKER

NOT LONG AGO at an A.S.T.E. Convention I listened to a talk by an authority on steel. Many charts flashed on the screen showed analyses of various kinds of steel and gave other technical data.

Perhaps to a man from Mars or someone with a super intellect, all that mass of data might have had a special interest; however, it made a particular appeal to my inferiority complex. I wondered if I could be the only one in the crowd so dumb.

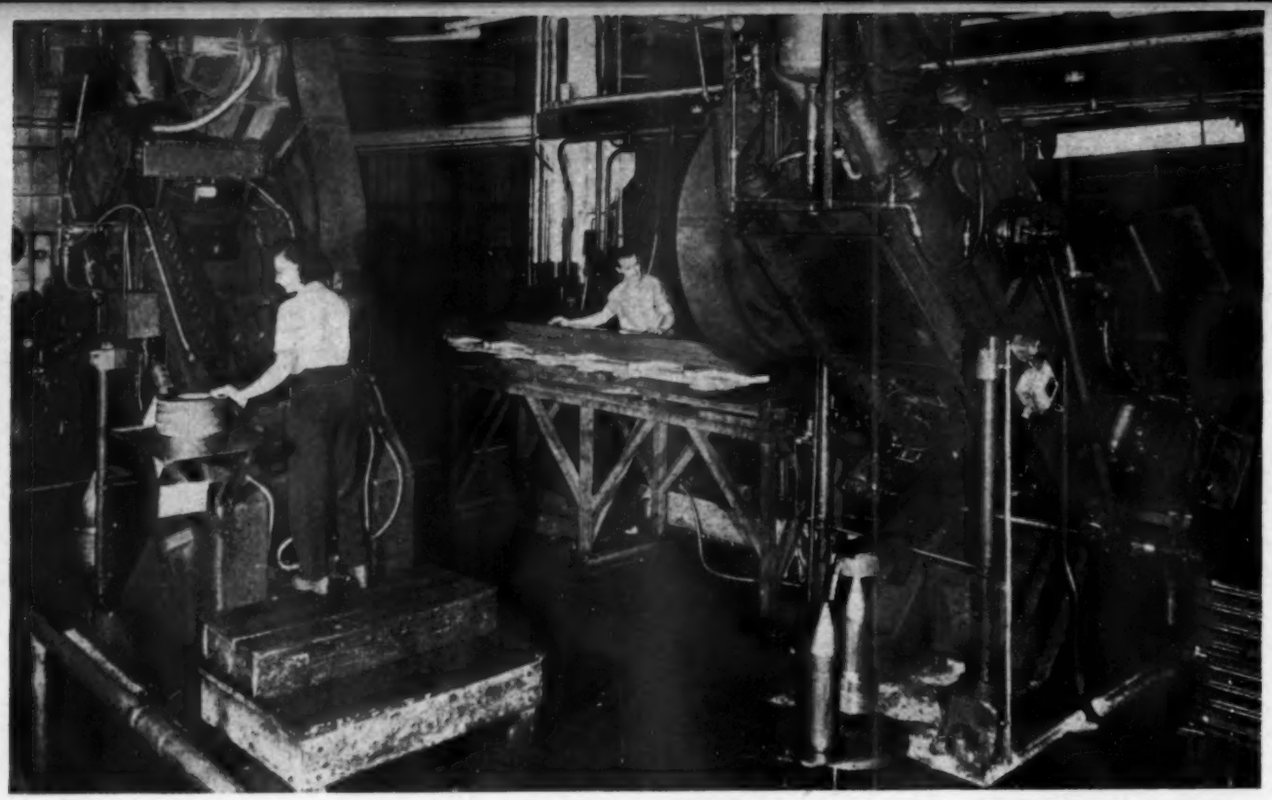
So I decided to find out. When the speaker asked for questions, I explained as best I could that there had been a time when I felt I knew a little about steel—at least the S.A.E. numbers meant something to me, not only as to type of steel but more particularly to machinability ratings, the latter being from my standpoint of bidding on various jobs by far the more important.

But since the Army, Navy, Air Force and other departments had butted in, each with its own special system of numbers, I was frankly lost and had finally adopted a hands-off policy on every job offered unless I had the S.A.E. numbers to go by. I then asked if there wasn't something that could be done about it.

The speaker said: "I'm afraid I'm in the same predicament as you are. I don't know the answer."

Is all this necessary? Are the Army and Navy trying to cover up S.A.E. 1020 with some kind of code that will make the Jap or Russia or the Hottentots think we are making pistonrods from balsa wood or winding armatures with clothes lines? Or are they really using steels that no one else has any use for or cannot be covered by the S.A.E. system? Or am I out-of-date—is there a new Esperanto system that takes the place of all these others? Or was it among those marginal notes I usually missed on the official blueprints?

In other words, what I am getting at is, why in h--l can't we standardize our standards? Why not do it now between coal strikes, steel strikes and auto strikes? Surely we'll have time now, if ever.



Strip and unit stock are being processed by these presses, which have been designed for variable speed. Ejection of parts is by gravity to a cone-shaped collecting fixture. Automatic feed will replace hand feed in the secondary-operation setup at the left

Variable-Speed Press Jumps Output

BY JOSEPH I. KARASH

PLANT AND PROCESS ENGINEER, THE RELIANCE ELECTRIC & ENGINEERING CO.

Adjustable-speed drive applied to inclined punch press gives 2 to 3 times unit production with repeat-stroke operation and properly designed dies

VARIABLE SPEEDS have been applied to punch presses in recent practice to achieve greater measures of safety and economy and added utility in general-purpose manufacturing. Further, automotive companies, experimenting with variable-speed punch presses, found they also have advantages in mass production. That a variable-speed drive can be as essential in a punch press as in any machine tool, is suggested by this field experience.

The practice to be outlined centers around inclined punch presses of 93-ton capacity. Press speed varied from 30 to 110 strokes, depending on the type of part, type of material (sheet or unit stock) and type of die used.

Press Construction

Presses were constructed to incline 45° because experience in this industry (motor manufacture) has shown that the conventional 30° tilt was not sufficient for proper ejection of parts. Die area was 24x24 in., shut height 11 in., and stroke 4 in.

The press ram is counterweighted by pneumatic cylinders, normal balance being on the negative side. Thus the ram, when free, tends to rise. Conventionally, weight of die would cause the ram to drop.

Penetration of the punch (or punches as the case may be) into the die is minimized by this counterweighting. The pneumatic counterweights hold the ram, and principal moving members, in continuous pressure against the crankshaft. Thus cumulative play in ram connections does not cause unnecessary punch penetration.

Normally, when the ram is not counterweighted, and as the ram screw is adjusted, a point occurs when the punches will indent but not pierce work. Very slight additional adjustment causes piercing, but also produces an amount of penetration greater than this final ram adjustment. Actually, until penetration occurs, the crankshaft is pushing the ram against the work. Once penetration occurs, the low point is reached because of the cumulative looseness of the various bearings, ram screw and other members.

The press is conventionally lubricated by a pressure system, but extra outlets are connected to the four die-set bushings to provide a constant supply of oil.

A cam-operated knockout arrangement was incorporated in the press for two basic reasons:

1. By adjusting the position of the cam it permits stripping the material at any part of the upstroke, providing a better time factor for getting stripped material out of the press and clear of the next operating

stroke. Operating speeds can be higher than with conventional "bump-type" knockout arrangements.

2. The cam-operated knockout is actuated by the roll riding up an inclined plane. Rather than abruptly bumping the blank from the upper member and causing it to fly back into the lower die, the inclined-plane stripping action is relatively a peeling of the material.

The cam block, a relatively inexpensive member, can be "tooled" to have any desired degree of inclined plane and provide any desired degree of decelerated stripping force.

The press is constructed with a friction clutch and a friction brake. Normally the press is in engagement against the brake mechanism by the use of springs. The flywheel is engaged to the clutch by friction, the engaging force being supplied by an air-cylinder. The mechanism is so designed that air-pressure failure automatically throws the brake into spring-pressure engagement.

The general construction of clutch and brake are such that the machine can be stopped at any part of the stroke through the timing mechanism or through emergency stop buttons on various parts of the machine. The ram will also actuate instantly as compared to a key-type clutch where the flywheel must reach a certain point of rotation in order to start the ram.

These V-S-driven presses are of flywheel construction, utilizing no back gears, and deliver the rated tonnage at 50 strokes per min. It is generally assumed that the flywheel blanking capacity changes approximately as the square of the speed. At 25 strokes per min., the flywheel would theoretically have approximately ¼ of its rated capacity.

However, the increase of speed over and above 50 strokes per min. creates a similar increase in flywheel blanking capacity, and at 100 strokes per min. the flywheel would theoretically have four times the rated tonnage. It is essential, therefore, to have a friction drive on a press operated in this manner so that in the event of an overload in the machine, the flywheel can slip and dissipate its energy rather than damage or destroy the press. In handling the type of work that goes through the Reliance plant, the entire range of speeds from 30 to 120 strokes per min. has been used.

Variable-Speed Drive

The presses are operated by V-S drive, a "spot-conversion" power unit, commercially obtainable in sizes from 1 to 200 hp., providing an adjustable-speed drive operated from any conventional ac. power source.

Basic components are:

(a) Motor-generator set and control in a dust-filtered ventilated cabinet. It can be located adjacent to the operation or elsewhere in the plant if it is more convenient.

(b) Adjustable-speed drive motor.

(c) Speed-adjustment rheostat.

(d) Electrical speed indicator, showing the press speed directly.

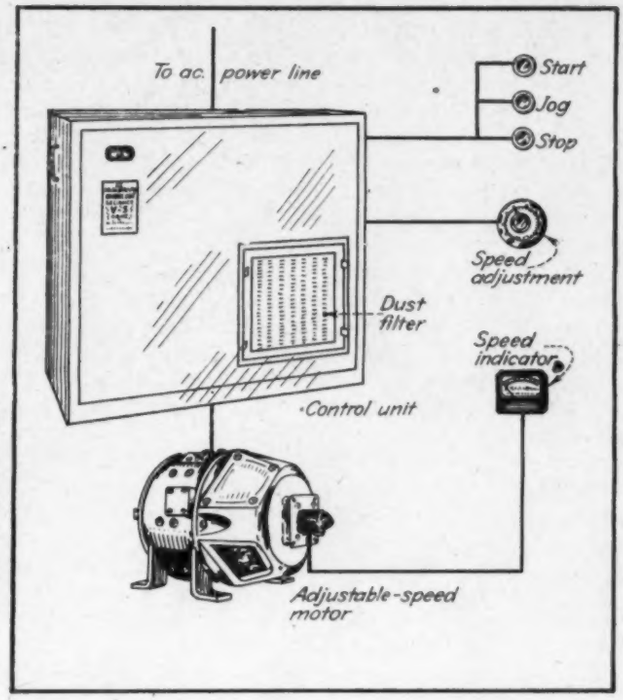
(e) Pushbutton stations for starting, stopping, jogging, or reversing.

This type of drive provides (a) remote control, (b) inching (jogging) and dynamic braking. Remote control puts the operation at the operator's fingertips, eliminating unnecessary steps and movements.

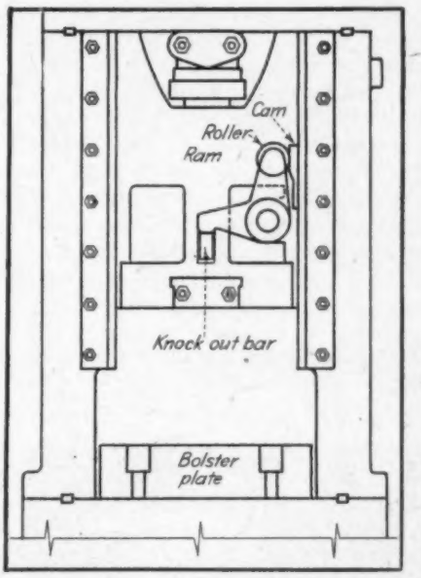
The inching, or jogging, arrangement allows close positioning of the ram for setup purposes and is accomplished by engaging the flywheel while the driving motor is stationary. With the electrical control set at a low speed, the driving motor is then jogged for minute ram movement.

One of the basic safety rules of press operation is never to reach into the danger area to make operational adjustments or repairs while the flywheel is rotating. Anyone familiar with press operation will immediately appreciate the delay caused by waiting while the flywheel goes on and on to overcome its inertia. Dynamic braking makes it possible to stop the flywheel quickly by pushbutton, using the driving motor as a brake.

The proper or desirable operational characteristics of a press drive is a somewhat controversial subject, particularly as to whether the motor drive should be "constant-torque" or "constant-horsepower."



This spot conversion unit can be located near the press or anywhere in the plant. Control may be handled at the machine or remotely, as in the case of sheet stock operation



The cam-operated knockout guarantees clearance of stripped stock before the following ram stroke, particularly important at high press speed. As parts are peeled off rather than bumped off, fewer pieces are damaged and die damage prevented

This relationship, when operating a variable-speed drive, is shown in an accompanying graph. From zero speed to the base speed of the adjustable-speed motor, the operation is constant-torque. Speed change is accomplished by rheostat-controlled variation of the generator voltage. If the speed range required of the press is within the constant-torque speed limits, then press operation can be entirely on a constant-torque basis. This is basically correct practice, as substantiated by oscillograph recordings, and available speed adjustment is 8 to 1 or greater.

If a greater speed range is required, then additional speed variation can be accomplished by field weakening of the adjustable-speed motor. The field-weakening control is from the same rheostat controlling the generator voltage, and the transition is stepless. When operating on constant horsepower, wider speed range can be obtained provided torque requirements are met.

Sheet Stock Blanking

The press with roll feed and scrap cutter attachments shown here is used for sheet stock of various sizes. The material is usually 26-gage, in 10-ft. long sheets which have been previously slit to required width. This is fed into the roll feed by the "Reliance" overlap method which allows the press to run continuously without stopping the ram between sheets. Each sheet, however, is synchronized to the ram stroke and sheet position.

The operator takes the top sheet off the pile, pulls it toward him and into the inclined trough guide. The entry feed roll is opened by touching the pedal and the operator slides the sheet into starting position just clear of the punch and die (the press is still continually stroking).

The sheet is registered to a backstop gage on the operator's end of the sheet. When the operator releases the control pedal, the roll feed starts in automatic synchronization with the beginning of the ram movement and feeds the material across the die.

As soon as the feed rolls on the exit side grasp the scrap material, the operator can open the entry rolls without stopping the feed of the sheet passing through the machine. While the first sheet is traveling into the machine, the operator places a second sheet on top of it and into the opened entry rolls. The operator registers this top sheet to the backgage and waits until the bottom sheet has passed from under the sheet he is holding in the inclined stock guide. As soon as the bottom sheet is clear, the operator removes his foot from the feed-roll control, and the sheet starts moving in synchronization with the ram.

Thus, the ram travels up and down without a stop and the sheets are fed in a continuous stream through the machine, having only one non-productive stroke between successive sheets. This extra stroke is necessary because the cumulative error in the travel of the sheet and the variation in the sheet length would otherwise cause overlap or underfeed.

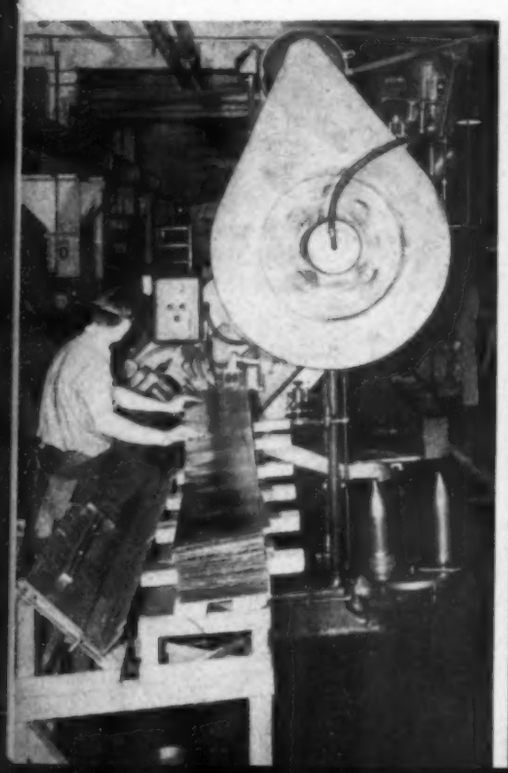
Speed of operation is largely determined by the nature of the work and design of the die. In general, ejection of material from the press is the controlling factor. A standard of operation for specific work and die is set up by experimentally increasing the speed of the variable-speed drive press until ejection trouble is encountered, and then slowing down ten strokes per minute.

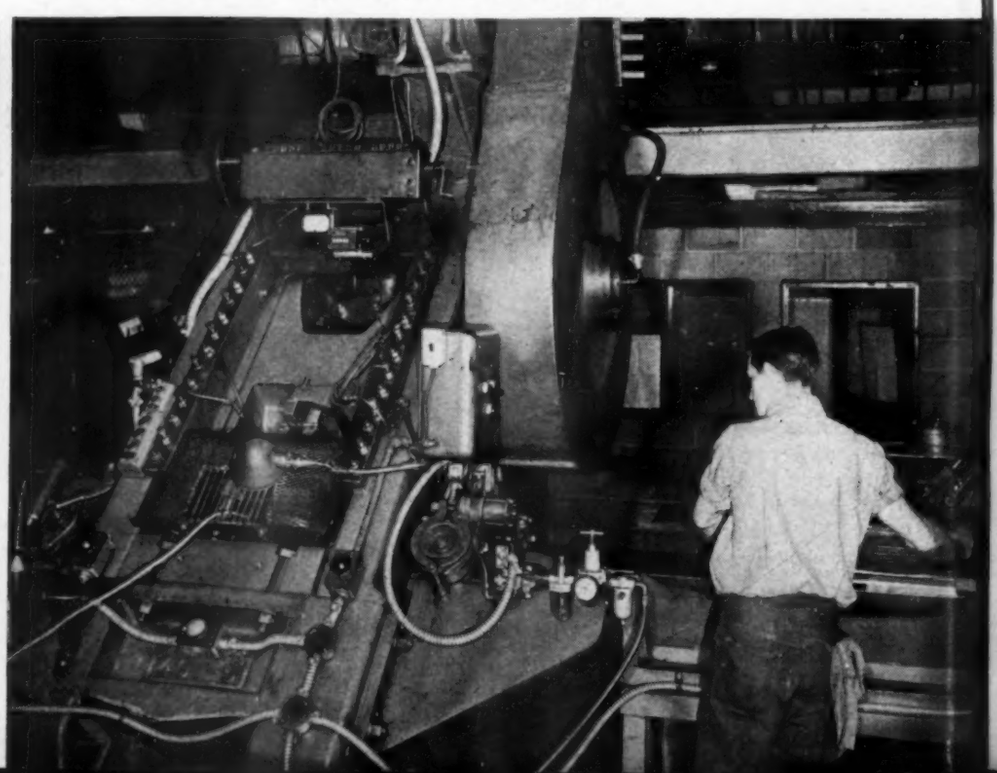
In feeding unit stock, there are two basic types of press operation, single stroke, and repeat stroke.

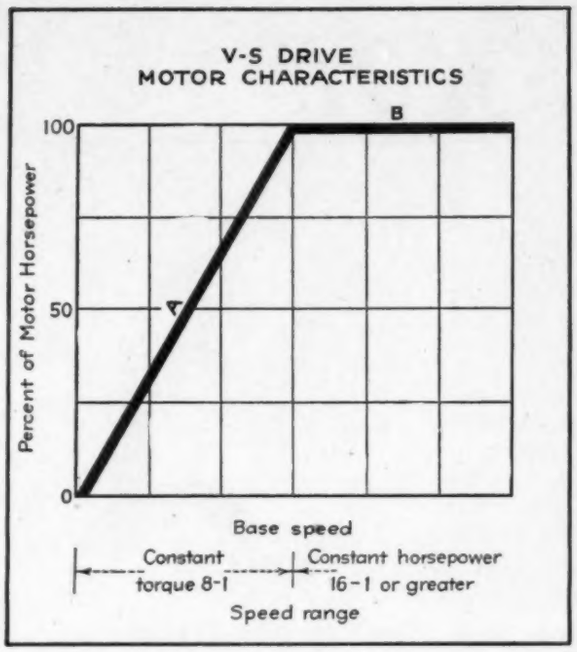
If the die or work are of such a nature that the operator must reach into the danger area to place or remove materials, then the ram must be stopped each stroke. Every effort is made to design the die (or convert existing dies) so material can be gravity-loaded and automatically ejected. However, if the operator must reach into the danger zone, then two-hand controls are used. If the operator removes either hand from the control buttons before the ram reaches a safe low point of the stroke, the ram stops instantly. Thus, the operator cannot trip the machine, beat the ram stroke and enter a hand into the danger area.

When the operator does not have to reach into the danger area to place or remove material, then the

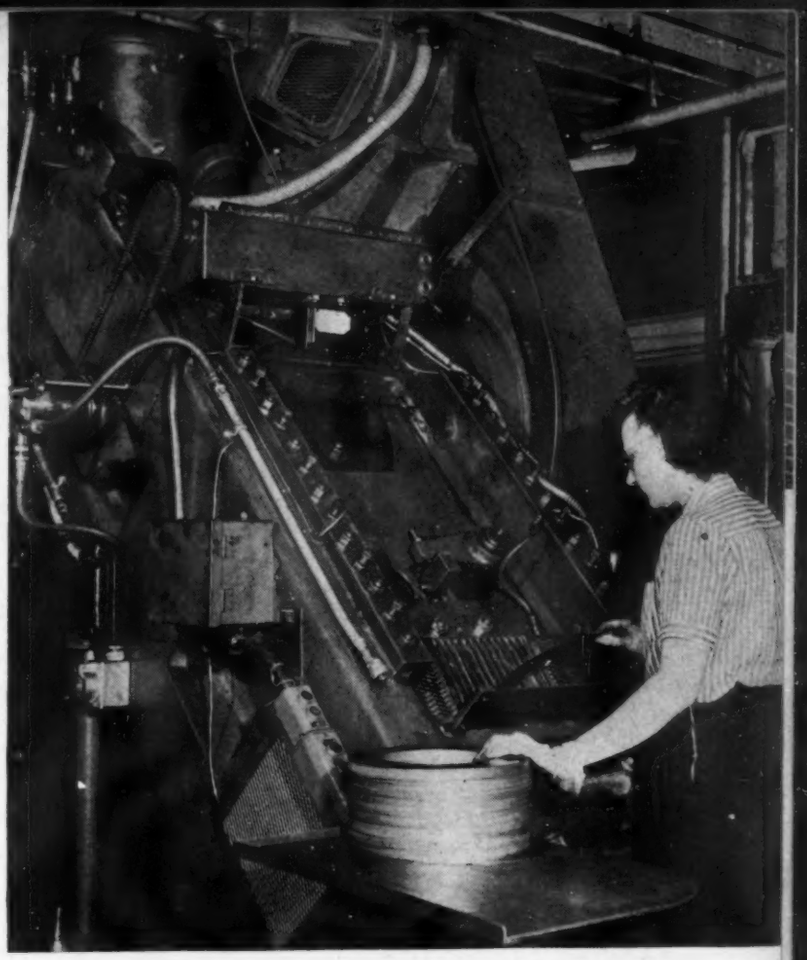
Operator places top sheet from stock pile into an inclined feed trough. Construction of the entry feed roll is shown at right. Entry side rolls are opened by an air cylinder, actuated by a pedal pressed by the operator. Die area is protected from dropped objects by a wire shield







Relationship of torque, horsepower and speed range on variable-speed drive. Most satisfactory practice is on a constant-torque basis, as indicated at "A", possible only when required speed range is within these limits. When both "constant torque," and "constant horsepower," "B," are being used, a practical speed range of 16 to 1 or greater can be employed



Unit stock can be hand fed with no operator hazard. Grooved feed trough may be varied for different stock sizes. Four pressure-lubrication outlets reduce die wear

danger area is screened to prevent inadvertent entry. When these conditions have been attained, then, and only then, can the ram be operated in repeat-stroke operation. The use of repeat stroke combined with the V-S drive creates a very efficient operation, for the speed of the press can be set to pace the operator at a speed which does not have the operator waiting for the machine, nor is the machine waiting for the operator.

In using repeat stroke, the start and stop element is eliminated from each stroke. Repeat stroke also allows the operator to stand on both feet rather than on one foot, as when operating the foot control for single-stroke operation.

Adjustable-speed Economics

The basic economics of press (or any machine tool) operation are largely controlled by design of the tooling. Adjustable speed cannot in itself overcome the disadvantages of improper or inadequate die design and construction. A properly planned and tooled job, however, can be operated much more efficiently with adjustable speed than with one fixed speed for all operations.

Single stroke, with manual ram tripping at each stroke, must be used when the die is unsafe or when the press speed is incorrect.

Any operation requiring an operator to reach into the danger area to place, remove, hold, or position material cannot be operated on repeat stroke. There must be a complete stoppage of the ram each stroke to make sure the operator's hands are safe before tripping the ram. Single-stroke operation is fatiguing because it makes it necessary for the operator to stand on one foot (when using pedal control). The fatigue factor of single-stroke operation is aggravated by the fact that this requires operator concentration and synchonization. As a contrast, the repeat stroke, when it can be used, sets an even, steady stroke that paces the operator. Repeat stroke enables the operator to stand on both feet.

When a die is so designed and constructed that the operator is not required to reach into the danger area (and the press is screened to prevent inadvertent entry), then and only then can the machine be operated at repeat stroke.

Repeat stroke in itself, however, is of no advantage if the running speed of the press is either too fast or too slow for the job. If the normal stroke is too fast, then the machine would still have to be single-stroked, for the operator could not keep up with the press. If the machine's single speed is too slow, the operator would be waiting each stroke. Thus the greatest advantage of adjustable-speed drive is with press operations that can be run repeat stroke.

The comparison expressed here cannot be directly applied to other circumstances, however, it will establish a general picture of the relative productive efficiency.

In the particular type of work illustrated (motor manufacture) it was found the proper adjustable-speed press operation made possible an average of from two to three times the output that could be achieved by single-stroke operation with the same die and material.

The expression of "2-3 times the output" will probably more clearly illustrate the results achieved than a specific listing of time value that will not illustrate the variations and foreign elements in those specific values.

TALKING SHOP

Book Larnin'

SOMETIMES a little book larnin' does help. In a Connecticut propeller plant, certain finish standards had to be met or the propeller went to salvage. Hand scraping was often required to give desired finish on certain parts. Along the line somewhere was a Joe who thought lightly of book larnin—for too long. Instead of tagging his propellers "scraped" as any college graduate would, the Joe persisted in tagging them "scrapped." When these very good propellers reached a certain sequence in inspection, this tag was duly honored—and the propellers were promptly cut up for scrap. Or maybe the inspector should have had training in reading a man's intentions into his scrawl.

Job Policy

"YOUR JOB AT CROSS" explains in detail just what the rules and regulations are at Cross Co., Detroit. It is required reading for every new employee — in fact, incorporates a place for signature on the last page. The accompanying statement indicates that the prospect has read the rules and will abide by them. It goes to the personnel manager. About 140 men, on two shifts, are concerned. There is no union — in fact, three required elections have all failed.

Hot Stuff

R. M. HEINTZ, of Jack & Heintz, told the annual S.A.E. meeting that he thinks hot-chamber die-casting will permit production of small aircraft and auto engines for $2 per hp., instead of the current $7 to $10. (Engine cost is currently holding down small-plane production.) Small parts like auto door handles can be cast thus from magnesium alloy to compete with zinc and aluminum die castings.

Bread and Ice Breaking

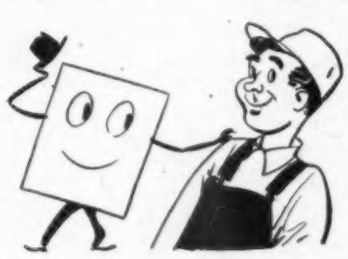
HERE'S AN IDEA from the textile industry: Harold J. Walter, treasurer and manager of Uxbridge Worsted Co., Uxbridge, Mass., and his wife are dinner hosts to 24 employees chosen by lot every three weeks. Number is limited by the capacity of the Rotary Room at the Uxbridge Inn, 18 miles outside Worcester. It was rough going at first, but Mr. Walter's initial talk got the parties off on the right foot. What he said in effect was, "You've heard we're so-and-so's—here's your chance to find out for yourselves."

Nowadays, most invitees come, settle down for an enjoyable meal, followed by movies of themselves at work and other current films. Each affair lasts 2½ hr. or so, and enough have been held so a high percentage of the mill's 700 employees have broken bread with the boss and his missus.

Uxbridge Worsted is unusual in having its own good-sized development lab., with at least one unit of each type in the mill. Thus actual production runs can be observed by a staff of engineers. Developmental parts are turned out by 14 machinists in a model shop.

Getting Cooperation

ONE EXECUTIVE in an auto parts plant has been introducing new ideas to men who have habits acquired in 25 years of doing the same things in the same way. He sends out weekly memos to all men involved in some new procedure or process that he recommends. If they apply it and get better production or better finishes or easier operation, he sends out a bulletin giving them credit by name and telling how they applied the idea and the results they obtained. Everyone likes a public "pat on the back." And he gets cooperation without pressure.



Town Meeting Transplanted

FEATURE of early—and present—New England democracy was—and is—the town meeting, where every man could speak his mind. Whiting Corporation has transplanted the idea to its plant, holds regular meetings at which executives report on company condition, then answer workers' questions. Over the years, the idea has caught on.

Stainless for Stamina

IN THE RECENT Firestone fire at Fall River Mass., an injection-molding machine took a terrific beating. It crashed through two floors, seriously damaging the machine and bending the tie-rods in spaghetti style. The shoe and various components of the partially closed mold were distorted by heat and cracked by impact. When the machine was dismantled and the mold taken apart, one set of components were found in excellent condition. These were the stainless-steel inserts (420 straight-chromium). They were shortly put back into production.

Submersible Kite

TO PROVIDE submarine crews with an elevated observation post, the Germans developed a skeleton-like combination autogiro and kite. Three rotor blades 25 ft. long are turned by the forward motion (min. 17 mph.) of the surfaced submarine to haul the kite and observer aloft (up to 500 ft.) from the conning tower just like you flew your box kite. This kite, however, has a collapsible steel-tube frame, so it can be stored in a watertight deck tube.

CONTROL..

AN American Machinist ROUNDUP REPORT TO THE METALWORKING INDUSTRIES

Mounting labor and material costs, closer tolerances and the looming competitive market are among major factors combining to force greater attention to process control in metalworking plants irrespective of size. To signalize this trend, the editors of American Machinist here present five articles on: production, inventory, quality, tool and maintenance controls. The quality-control article is the third part of a 4-article series dealing with the fundamentals, the other four are detailed descriptions of exact methods now in successful use in as many outstanding plants

PRODUCTION CONTROL Spots Shortages

BY WARD A. RING, PLANT MANAGER, WOODWARD GOVERNOR CO.

PARTS NEEDED for the manufacture of prime-mover governors at the Woodward Governor Company are delivered to assembly according to prearranged schedules. This is done by the stock department, which also is responsible for writing requisitions for raw materials as well as for manufacturing operations required to convert these materials into finished parts.

Parts stocked for standard governors are controlled by a perpetual inventory system. Replacements are requisitioned when incoming-assembly schedules show the minimum ordering quantity for any part will be reached within the time required

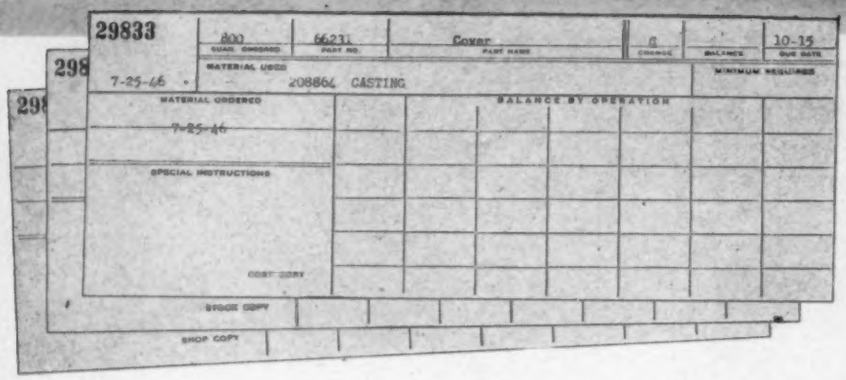
Ready liaison between shop and production control, together with a visible control system, focuses attention on critical shortages

to manufacture such parts in economic lot sizes. In addition, the stock department requisitions production operations on special parts required on customers' orders.

This arrangement usually functions to maintain production without attention from management. The production-control system that makes this possible is arranged so shortages are brought to the attention of the production manager in time for action to be taken to insure maintenance of shipping schedules.

In the production-control office, a series of Wassell "Produc-Trol" boards show the status of each manufacturing order in production at any given time. Supplementing these visual control boards are shortage reports sent to the production-control office by the stock department whenever delays appear imminent.

Parts requisitions issued by the stock department are made up in triplicate. The original copy and the third or "shop copy" are sent to the methods-engineering depart-



ALL REQUISITIONS for parts are initiated by the stock department for economic lot sizes when perpetual inventory records show that supply has reached the minimum ordering point. These requisitions are checked by methods engineering before delivery to production control

ROUTED BY DATE 8/30/46 — 66231 — 3 — 1

MATERIAL DESCRIPTION: CASTING (PERM. MOLD) — ENG. CHANGE NO. G-15051-24

OPER.	MACH. NO.	DESCRIPTION	DETAIL	TOOLS	
2	4140	Finish bore cup, bore rack holes, chamfer			
		and semi-finish face.	*	Tools	
5	4050	Polish and remove parting lines carefully.			
3	4220	Drill, ream and c'bore stud holes.	*	Tools	
8	4220	Drill and ream control shaft.	*	Tools	
24	4380	Profile control shaft hole in cup.	*	Tools	
30	4320	Mill stop lug.	*	Tools	
9	4320	Mill slot in boss.	*	Tools	
11	4210	Drill, c'bore and tap stop lug.	*	Tools	
17	4210	Tap 1/4-20 (4) holes.	*	Tools	

PART NO. 66231 — PART NAME COVER. — ORDER NO. 29833 — DUE DATE 10-15 — QUANTITY ORDERED 800 — OPERATIONS 1 2 3 4 5 6 7 8 9 10

ROUTING SHEETS, made up by methods engineering for each part manufactured in the plant, list operations in the sequence in which they are to be performed and specify the machines on which the work is done

ment, while the second copy is filed in the stock department as a record for use when follow-up may be required.

At the same time, the stock department issues requisitions to cover raw material needed to make the part. This requisition also is routed first to methods engineering for verification of stock size and type of material before it is sent to the raw stock crib or to the receiving inspection department for release of material to production.

In methods engineering, master routing sheets are made up and filed for each part to be manufactured in the plant. These master sheets are typed against a Hectograph backing so route sheets to cover each part requisition can be reproduced on a Ditto machine.

Master routing sheets are kept up-to-date so they show the latest engineering and methods changes for each part. If a parts requisition received from the stock department does not show the latest engineering change letter, the order is referred to the engineering department for clearance before it is issued to the shop.

Methods engineering has a permanent record of each change made necessary by an engineering change in part design, as well as of each change in routing or operation detail made necessary by adoption of improved tools or methods.

The routing sheets, reproduced in methods engineering, list the manufacturing operations required to make each part, with operations identified by number and tabulated in the sequence in which they are to be performed. The numbers often are not in the same sequence as that in which the work is to be done, because an operation is always identified by the first number assigned to it, even though the sequence of operations later may be changed. Even when an operation is cancelled, its number is not reassigned.

The routing sheet also shows by means of an asterisk (*) in the column headed "detail" whether a process drawing has been prepared for that particular operation. Such drawings are made up by the methods-engineering department for each operation where the production worker needs information not shown on the engineering drawing. Location points, reference dimensions and the location of the surface to be machined are indicated clearly.

The latest engineering and methods change is noted in the "change record" column on each process drawing for a given part, whether or not that change affects the operation shown. This is done to identify each process drawing with the latest change so there can be no question as to whether it is authorized for use with parts ordered on a given requisition.

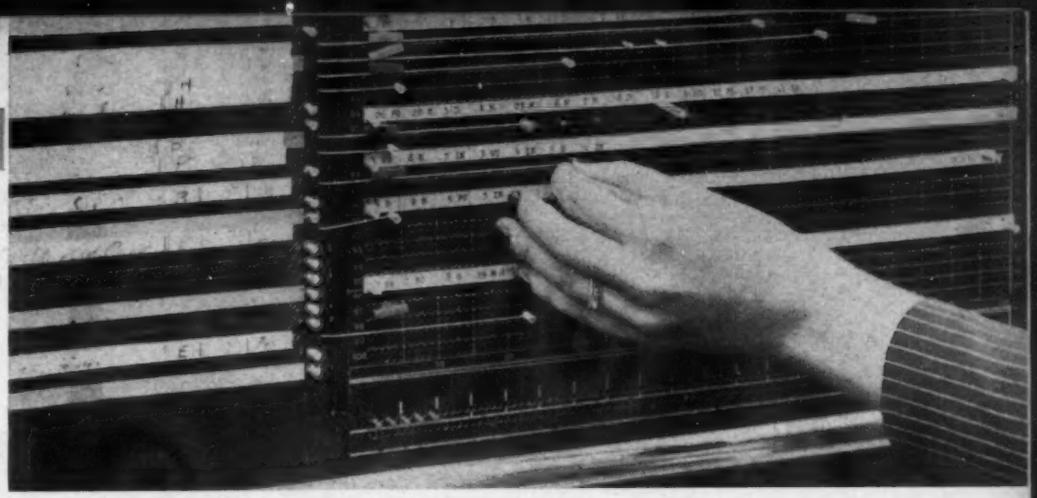
Tools Available Shown

In addition, the routing sheet for a given part indicates in the "tools" column whether or not tools are available for each of the operations listed. If tools are needed for a given operation on a given part, they are listed on tool record sheets.

Reference books containing tool record sheets for all parts made in the plant are kept in methods engineering, in gage and fixture rooms and in the tool cribs. When an operator is given a job on which tools are required, he refers to one of these books and requests delivery of the tools listed for the operation.

After a methods engineer has checked a parts requisition to make sure that it lists the latest engineering change and that the routing sheet carries the latest manufacturing information, an operation strip for the Produc-Trol board is typed to show necessary operations. The three forms are then sent to the production-control office.

Upon receipt of a manufacturing order from methods engineering, production control sends the original copy of the finished-parts stock requisition to the cost department and places the "shop copy" with its operation strip in the proper loca-



IN PRODUCTION CONTROL, the status of each requisition in process is recorded on Produc-Trol boards. A copy of the requisition is filed in a pocket at one end of the control board, in line with the operation strip for that order

tion on one of the control boards.

These control boards are grouped according to type of governor, and individual requisitions on the boards are arranged according to part number. This simplifies the problem of production-control expediters, who must refer to the control boards frequently to locate orders in which they are interested and to post on the boards the latest data concerning these orders.

When a work order has been placed on the control board, the accompanying routing sheet and parts drawings are placed in cellophane envelopes for delivery to the shop. Frequently, a routing sheet is not large enough to list all operations required on a given part. In such cases, several routing sheets may be needed, being clipped together in the work envelope.

When an operator completes his assigned task, he initials the routing sheet in the right-hand column, marks the date he finished the operation in the "tools" column and shows the number of parts he completed in the "detail" column. As inspection operations, as well as production operations, are listed on these sheets, they serve as inspection records when the inspector initials them to show completion of the operation assigned to him.

Each foreman in the machine shop makes up a daily production report which is sent to the production-control office. When an operation is completed, the number of pieces finished is shown in the fourth column. Operations started are reported by leaving this column blank and filling in the other three columns.

Data for these daily production reports are transferred to the control boards by the production-control clerk. She notes on the shop copies of part requisitions the operations completed, the number of parts completed and the date each operation was finished. In addition, she moves pegs on the control boards to show the changed condition of the orders.

Position of the white peg with the string attached shows the present location of the part as indicated on the daily report. Round yellow pegs show operations that have been skipped for one reason or another. Frequently, the sequence of operations, as shown on a routing sheet, can be changed without affecting the accuracy of the product. This may be done when work must be kept moving on a lot of parts and some machines are tied up with other work. Round green pegs show operations in work.

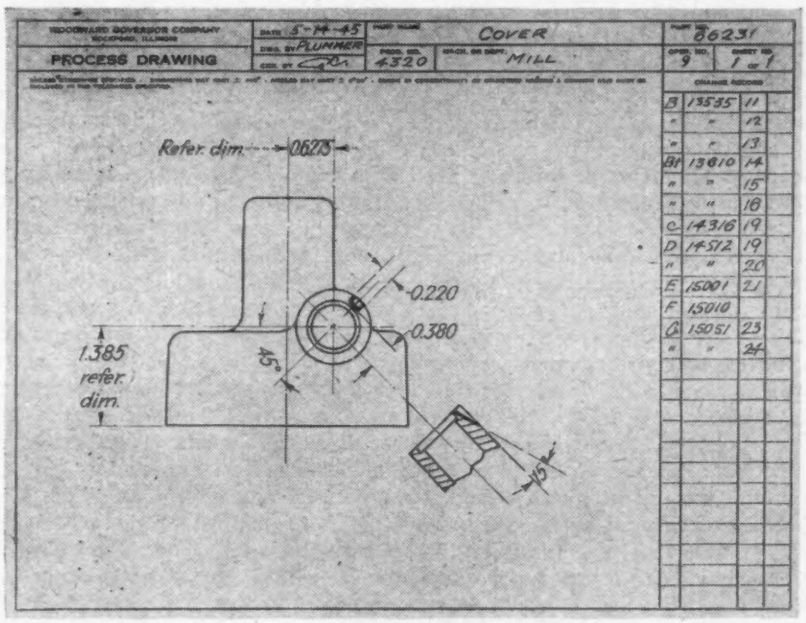
Red Pegs Signal Shortages

Red pegs with rectangular heads signal present shortages or shortages anticipated within the current month. Such pegs, placed at the left-hand end of the control board, serve as warning flags to the production-control manager and to expediters. The expediters list these orders and check them with machine-shop foremen at regular intervals to make sure that work on these orders is hastened as much as possible.

Green pegs with rectangular heads show orders on which shortages are expected during the next month. These orders also are watched carefully by expediters but do not get the same attention as do orders showing red pegs.

Lavender pegs with rectangular heads indicate orders that have been split to expedite the production of a small quantity moved ahead of the rest of the order. This makes it possible to move some parts into the stock room to take care of immediate assembly requirements. Heads of the lavender pins are marked with pen-

TO AID MACHINE OPERATORS in setting up new jobs, methods engineering prepares process drawings showing reference dimensions, locating points and the work to be done in the specified operation



DEPT. 2
SHIFT 1
DATE 10-1-46

DAILY PRODUCTION & COST REPORT

MACH. CAP'Y.
MACH. EFF'Y.
MAN EFF'Y.
DEPT. EFF'Y.

MACH. HRS.	PART NO.	ORDER NO.	NO. PCS.	OPER. & MACH.	ST. COST	Y'DAY COST	PROD. HRS.
	53940	30396	288	8			
	5[illegible]42	30392		11			
	010210	61955	192	20			
	010210	62277		20			
	040596	62805	84	35			
	67001	30672		68			
	530112	62582	97	25 and 22			
	030112	62265		25 and 22			
	120942	84202	2	2, 3 and 4			

Each foreman submits a daily production report to production control, showing operations completed by indicating the number of pieces completed and operations in process by leaving this column blank

Parts found to be in "short supply" when the stock department gathers parts for delivery to assembly are listed on this form, which is delivered to the production-control manager for his personal attention

SHOP ORDER NO. 8027 QUANTITY 4 DATE ISSUED 6646
CUSTOMER DATE PICKED UP 9 - 21 - 46
GOVERNOR DESIGNATION 012101 SCHEDULE DATE 10 - 1 - 46

PARTS SHORT

PART NO.	PART NAME	NO. SHORT	PROD. ORDER	NO. ON ORDER	REMARKS
010241	Collar	6			Purchase - G14174
020048	Sleeve	4	61998	500	G G B I
186051	Pin	4	62896	1034	B I H I G I
~~190001~~	~~Base~~	~~5~~	~~62417~~	~~24~~	A
198030	Shaft	1	62459	5	M G M M B I
010023	Cyl. Head	4	62218	43	B I
	9/21				
	9/23				
	9/26				

DAILY SHORTAGE PROGRESS REPORT

Date

TO:

FROM: Production Control Diesel and Hydro.

The following parts are in this week's shortage and at present in your department. They carry first priority. Were they worked continually today?

Part No.	P.O. Number	Part Name	Yes	No	Moved to

This report will be delivered each morning and picked up each night by the Production Control office. The above record must be filled in by you, the departmental supervisor.

A. H. NIELSEN.

Production control uses this form to advise departmental supervisors of work in their department that must be rushed to relieve shortages in the stock department. These reports are made up daily and must be returned to production control the same day, reporting the status of each order listed

cil to show the quantity of parts moved ahead of the rest.

These lavender pegs are placed in the section of the control board under the number of the operation being performed on this small lot of parts. The expediter responsible for that order moves the lavender peg ahead as operations are finished.

If, when the stock department starts picking up parts for assembly on a given production order, it is found that some parts are needed to complete the order, a special report is made to production control. This report calls for personal checking by the production-control manager.

He is responsible for reporting to management any delays in manufacture of listed parts. The report is arranged for filing in a loose-leaf notebook that he can carry with him when checking the orders listed with machine-shop foremen and others. He indicates, in the "remarks" column, the operations yet to be performed on the parts listed and circles these operations as they are finished.

When the required number of parts have been finished and delivered to the stock department, he crosses out this line on his copy of the shortage report. In the lower portion of this form, he indicates the date when he made a personal check on the operations listed.

To aid the production-control manager and his expediters in following progress of parts listed as being in short supply, a daily shortage progress report is prepared by production control for each machine-shop foreman.

These reports are delivered each morning and picked up at the end of each day by the production-control office. Departmental supervisors are requested to report personally on the orders listed on these reports, as insurance that such orders will have personal attention by interested supervisors. Close contact is assured by direct telephone connection from supervisors' desks to production-control in a glassed-in balcony.

Normally, about 1,100 orders for stock parts are in process through the shop at any one time. All these come under the supervision of production control and are listed on the control boards. An average of 150 orders are completed each week.

Most require little attention from expediters, except when shortages of materials delay manufacturing operations to such an extent that delivery of finished parts to the stock department is behind schedule. Recent difficulties in securing materials from outside sources, experienced by all types of industries, have increased the shortage report lists materially. Under normal conditions, only a small percentage of parts orders in the plant are red-pegged.

Card and Quantity-Chart System Controls 32,000-Item Inventory

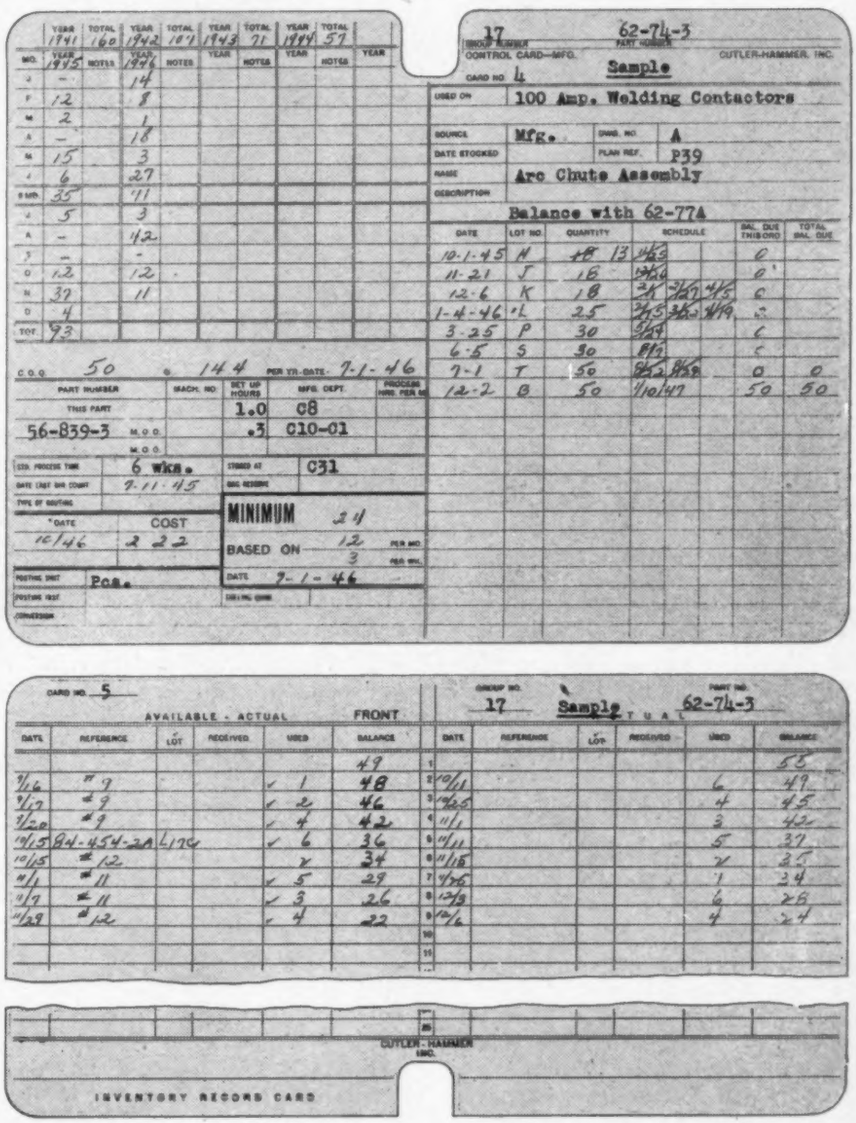
Materials and parts shortages, lagging deliveries and terrific demand are combining to swell inventories to dangerous levels. This method of control is being used successfully in one plant

BY WILLIAM F. LENT
PRODUCTION MANAGER, CUTLER-HAMMER, INC.

INVENTORY CONTROL is both important and difficult. During recent months, inventory has been more difficult to hold down than it has been for a long time; yet an excessive inventory is a greater risk than it has been for years. Current conditions all seem to exercise a pull in the wrong direction. Customers clamor for production beyond plant capacities, raw materials and purchased parts are scarce, and the time of actual receipts unpredictable. Inability to obtain this or that item postpones use of other items destined for the same product, with resulting severe losses of output and expensive unbalance of inventory.

All these factors combine to create a ticklish and significant situation in which an inventory which has been swollen beyond normal can become extremely dangerous. At today's high operating levels, any sharp decline could transform excessive inventory into a burden of severe proportions, and likewise, a sharp decline from today's price could be financially embarrassing.

U. S. Department of Commerce statistics show clearly what the forces combined in today's situation are doing to inventories. The value of all business inventories (including wholesale and retail distribution) has been rising by at least $1 billion a month since early summer.



1 **BASIC RECORD** in inventory control is this visible-index card maintained in the stores dept. It shows, for a specific item, number used by months for two years, cost per piece, machine setup time (if the piece is made by C-H), normal interval between order and delivery, perpetual inventory (including "commitments" to manufacturing for assemblies to be shipped in the next 3 mo.)

Manufacturers' inventories at the end of October reached a new peak of $19.5 billion, up $2.3 billion in four months. Corroboration of these figures can be found in the sharp rise of banks, commercial loans.

For 14 years our company has concentrated a great deal of management thought and personnel on the problem of inventory control. The necessity of carrying 33,000 items in stock for the conduct of our business provides a real incentive to handle inventory effectively. Improved operating results show up promptly whenever we succeed in making even a minor improvement in the control of these items. Recently we have seen a tendency to over-travel our planned inventory levels despite our complete system of control, but our methods have succeeded in calling the conditions forcefully to the attention of management and thereby giving us the opportunity to apply corrective measures before the curve can swing too far off the charted course.

Basic Record A Card

The basic record in our inventory control is a visible index card file maintained in our stores department, Fig. 1. Each item is represented by a card showing all relevant facts.

In pre-war years, when our sales department's persuasive powers were channeled toward booking orders from customers instead of convincing the factory that it can safely promise delivery of existing orders earlier than its first impression, inventory planning began with a sales estimate by lines of product for coming months. Presumably there will come a time when this condition will again prevail.

Nowadays, however, the first planning step is for the sales manager to settle down with the works manager and the production manager to schedule an allocation of manufacturing capacity to each line of products. This schedule is set up in dollars because the sales department does its planning in dollars. But the factory obviously must go on to develop a figure for the company's future annual product requirements in units of each item.

To convert from dollars to units of output, the stores department uses the allocation schedule to develop a ratio for each line of products. We define sales ratio as "the ratio of estimated future shipments to past shipments."

Suppose that we formerly sold $1,000 worth of a specified product. We are now scheduled to make $1,200 worth. So, $1,200 ÷ $1,000 = 1.2, the sales ratio.

The stores department refers to the card record of the part in question. The number used in the past six months is then multiplied by 1.2 to estimate the rate of "future annual quantity." The sales ratio is actually a corrective factor applied to the card record of past use, and this procedure is self-correcting. Even if sales estimates should prove wrong, basing our computation of "future annual quantity" upon actual performance figures for the past half-year keeps us from going blindly in the wrong direction.

From this point forward, all actions of ordering, purchasing, and planning inventories stem from the "future annual quantity." Hence the importance of calculating correctly.

Once this figure has been arrived at, two problems arise: (1) When to order; and, (2) Quantity to order.

When to Order

When to order is determined by a simple mathematical formula. Factors used in determining this are shown on the perpetual inventory card. They are: Number of weeks required for delivery after issuance of an order to the shop or vendor, and the expected rate of use. A new supply must be ordered when the supply on hand, as shown by the perpetual inventory record, is just sufficient to run inventory down to the predetermined allowable minimum.

The allowable minimum is a safety factor, set to assure that enough pieces will be on hand to meet production needs for the time which experience has shown us is adequate in view of suppliers' reliability on deliveries and our own ability to improvise. If the piece is used in practically every product we make, then we provide a greater factor of safety.

Quantity to order is also mathematically determined.

P = shop preparation cost for getting an order started to make the first piece—machine setup plus other shop expenses of starting a run

Q = quantity of part to be ordered

U = unit cost

C = carrying charge (interest, taxes, insurance, and similar items).

A = future annual quantity

Then the unit procurement cost is P/Q. The total carrying charge is $Q/2A \times U \times C$. We graph the two lines; where they cross is the ideal number of pieces to order, because this quantity produces the least total cost per unit used. What we have done, in mathematics, is to equate these two quantities and solve for Q.

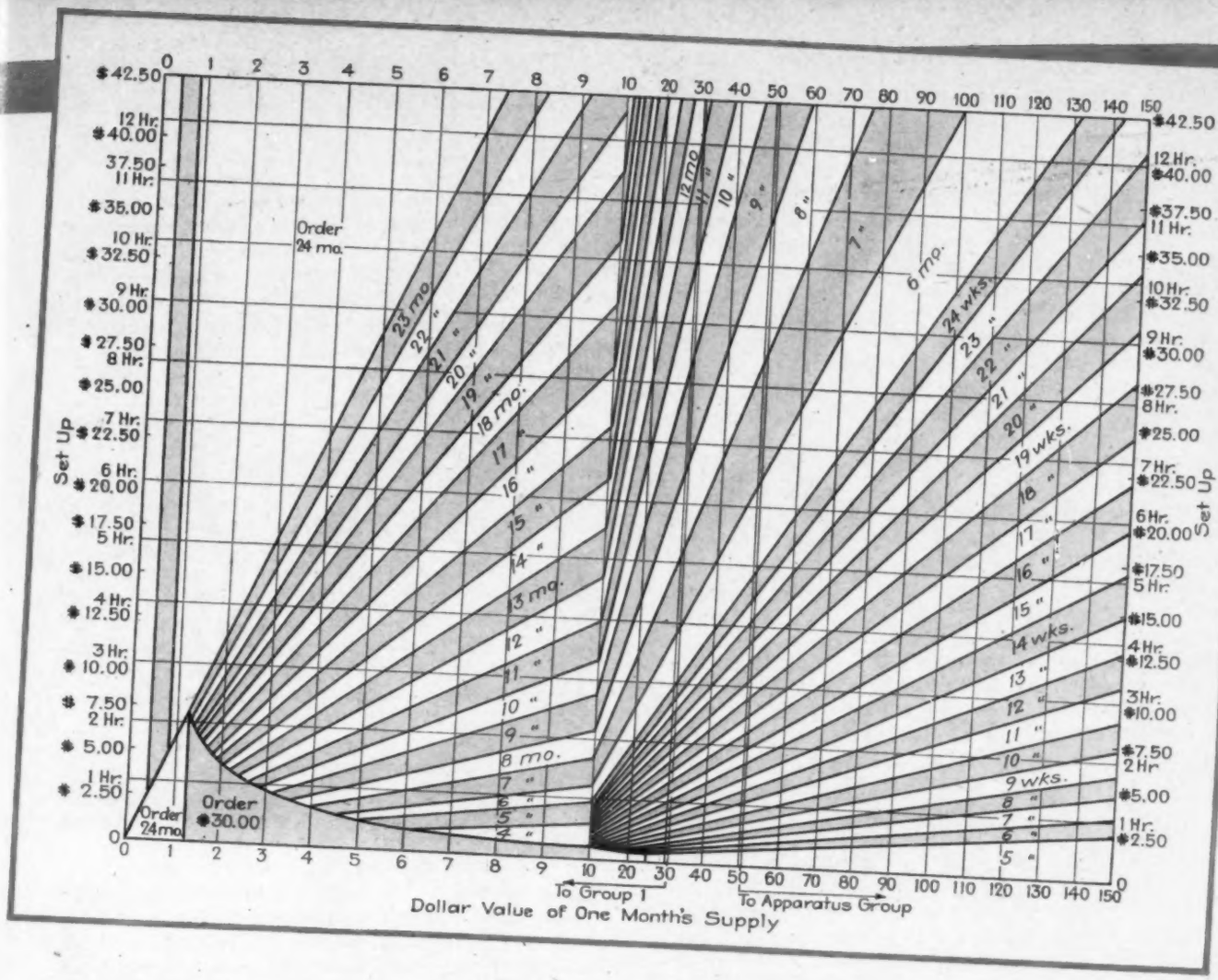
Chart Simplifies Job

It would be hopelessly complex to perform this operation each time before ordering. Actually we have developed the ray chart, Fig. 2, the graphic solution of this equation. The order clerk ascertains from the perpetual inventory record card the unit cost and the estimated use per month; from this he learns the dollar value per month's supply. He also reads on the card the shop preparation cost or hours.

Now he turns to his chart. On the horizontal ordinate he finds the cost of a month's supply, on the vertical ordinate the preparation cost. The intersection of these lines lies in a zone which indicates how many weeks' or months' supply to order.

Examination of the C.O.Q. (Correct Ordering Quantity) chart discloses two portions which are obviously exceptions to the mathematical formula. A left-hand vertical column tells the order clerk that in ordering any item of which the total cost is less than $20, he may order up to four years' supply. At the bottom of the C.O.Q. chart is an irregular, wedge-shaped area which tells the order clerk that he can order a 24-months' supply or a $30 total cost limit, whichever is smaller. These are, of course, arbitrary decisions based upon a common-sense desire to avoid frequent ordering in small lots, a nuisance to the vendor or to our own shop.

We short-cut the record routine in keeping track of many small-value items, but we use the same chart method for determining correct ordering quantity. (To allow for the rougher approximations, the minimum safety stock for these items is set much higher). These items are what we call Group I, and constitute



2 **THIS RAY CHART,** giving a graphic solution of the correct ordering quantity, saves tremendous amounts of time for order clerks. Note two exceptions: For items costing less than $20 total, up to 4-yr. supply may be ordered. In lower ranges, either 24-mo. supply or a $30 total cost limit, whichever is smaller, may be ordered

50% of the total items, but only 20% of the total stock-parts cost.

Our top limit for Group I now runs up to $50 monthly use. (Items between $50 and $30 monthly use may be placed in Group I or Group II, depending upon the judgment of stores department personnel.) All Group I items are purchased or factory-ordered to meet needs indicated by the over-all company sales ratio rather than attempting to compute the need by individual lines of product. Cost of these items is eventually charged out not to specific job tickets in the shop but instead the cost is spread across the total cost of sales.

Group II includes all other items, totalling 90 segregated lines of products. This group is broken down into two lines for inventory control purposes: (1) Direct-control product line; and, (2) Commitment-control product line.

The direct-control product line consists of repetitive standard items in continuous production. These are manufactured on a floor-stock basis. All costs on these items are charged to the cost of sales of a line of products, not to specific orders. We know what the dollar allocation is for each of these lines, so we load the plant to these limits only. If the line, for instance, comes in four sizes, then we load within the allocation of these sizes or sub-varieties. The monthly requirement for a part used in this type of manufacture is written on the perpetual inventory card and committed by months, and for three months ahead of the planned shipping date.

The commitment-control product lines consist of items manufactured intermittently because they are used in too small a volume to justify continuous production. Such items are made up on special orders, even though they may be standard products. Material is withdrawn from the stockrooms for each individual order. Costs are kept by individual orders. Requirements for a part in this type of manufacture are written on the perpetual inventory card and committed by individual order number.

A major simplification of our inventory control comes about through a plan that we call "cull quantities." No requisition totalling less than $2 for items costing less than 25¢ each is forwarded individually to the stores department for posting on the perpetual inventory card. Instead, as the requisition is filled a copy is slipped into a pocket on the stock bin. Every two weeks the quantities on all such small requisitions for an item are totalled on a master requisition, which then goes to the stores department for posting. The total quantity is posted on the perpetual inventory card and the dollar value is charged to cost of sales. Original requisitions thus consolidated are thrown away. It works out that more

than half of all requisitions are discarded under this simplified routine.

To justify the cost and attention that it requires, an inventory control system must enable management to pre-plan inventory limits lower than would be possible without the system, and also permit holding actual stocks close to the planned limits. We measure performance of our controls by a monthly report on inventory analysis and a monthly report on shipping rates.

A study of performance during recent months—the most difficult period production-wise and inventory-wise in the experience of most manufacturers—shows that our inventory performance was close to planned values during the early part of 1946, Fig. 3. It hit the estimates almost precisely in June and July, actually under-traveling in August and September. Not until October did real trouble set in. Most of the October inventory increase came from unbalance, which arose because failure to receive deliveries of a relatively few important raw materials and purchased items delayed completion and shipment.

The October inventory figure hoisted a storm warning that sent our management into action. As this is written, late in December, it seems that our efforts have slowed the rate of inventory increase by a substantial amount, although we have not yet it turned it definitely downward.

Although inventory control is in theory purely a result of mathematics, it is important that the mathematical computations be kept abreast of changing conditions. Moreover, judgment necessarily tempers the pure mathematical aspects. Minimum safety stocks, for example, are determined in part by arithmetic but rather more by judgment. The decision is not always made by management, may in fact come from an order clerk's super-caution on all items under his jurisdiction following a criticism for permitting too many shortages in items under his charge. Our curbstone guess is that whether a bull or bear psychology prevails among the order clerks probably moves our inventory totals up or down by as much as 10%.

Again, a shop foreman may be over-pressed for production. What is more natural than for him to riffle through his stack of job tickets and combine two or more orders to save setup time, even though the later orders are not scheduled for immediate delivery? He gets increased output, but also he boosts inventory by the extent to which he has jumped the gun. If he keeps on doing this—and it is an understandable temptation under present conditions—he inevitably falls behind his production schedule on some items more urgently needed. By failing to produce on time an earlier-priority item, he delays use of other items which must lie longer in the bins. This slowup, in turn, may encourage other order clerks to increase their minimums beyond the authorized amounts, lest they encounter shortages. It is a vicious circle.

Because of these and similar possibilities of running inventory beyond the planned limits, we are currently taking five steps to apply the brakes. These are:

(1) Re-examining the mathematical formulas for determining our order quantities and arbitrary rules that in practice modify formulas.

(2) Reminding order clerks repeatedly that it is extremely important right now not to order material to arrive before stocks will get down to the planned minimum.

(3) Re-examining with more than normal care the orders in our shop shortly before they are scheduled to run. If rate of use from existing stocks is not up to expectation, we set back the order accordingly.

(4) Reducing all minimum safety stock quotas that can stand it.

(5) Re-studying all items of inventory to determine whether an economical way exists to eliminate a stock at any intermediate stage. Possibilities include: combining two or more manufacturing operations; and shifting from purchase to manufacture, to reduce order quantities.

MILWAUKEE PLANT OPERATIONS, 1946

Manufacturing Capacity = 100 (in dollars, at January, 1946, prices)

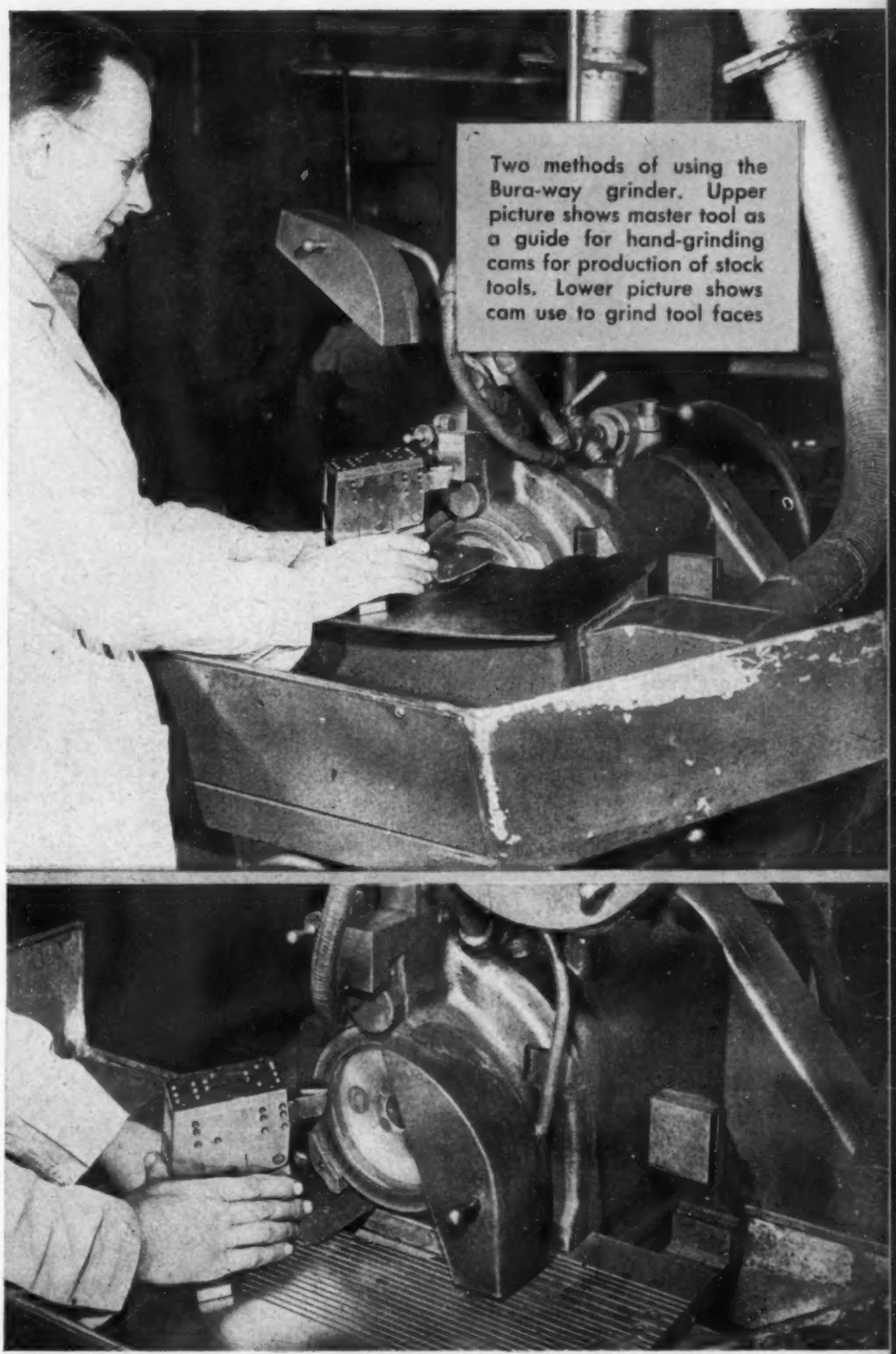
	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
1. Shipments, estimated on 1-1-46	80.0	95.0	100.0	100.0	100.0	100.0	100.0
2. Shipments, re-estimated on 7-12-46		80.0	86.7	90.0	96.7	100.0	100.0
3. Gross billings, actual	74.5	71.2	87.6	82.3	94.3		
4. Estimated output at new selling price—							
(Assume no change in labor or purchasing rates)	95.0	96.7	100.0	100.0	100.0	100.0	100.0
Inventory change at cost	+12.3	+12.3	+10.0	+7.7	+2.5	0	0
Inventory at end of month without repricing—additions only	199.8	212.1	222.1	229.8	232.3	232.3	232.3
5. Total inventory, actual	199.9	212.2	217.7	217.8	240.0 (est.)		
6. Total inventory change at cost, actual	+12.5	+12.2	+5.4	+6.8	+15.5 (est.)		

3 **TABULATED EXPERIENCE** for the last six months of 1946. Shortages forced midyear scaling down in production, but inventories were held closely to estimates in June and July, a bit under in August and September. October inventories hoisted a storm warning (resulting from non-deliveries) that sent management into action to slow up inventory increases

Production Methods Aid Carbide Control

Long-run economy, efficient carbide tool grinding, improved routing and ordering at Jack & Heintz made possible by line production and simplification of standard tools requisitions

BY HAROLD L. FLYNN
ASSOCIATE EDITOR



Two methods of using the Bura-way grinder. Upper picture shows master tool as a guide for hand-grinding cams for production of stock tools. Lower picture shows cam use to grind tool faces

CARBIDE CONTROL at Jack & Heintz Precision Industries, Inc., is on almost a production line basis and the measure of control and standardization extends to the production-line requirements as well as the carbide department itself. Although the company uses carbide-tipped tools in considerable quantity, carbide grinding on a production basis is not mandatory—but it is the most economic and efficient method of utilizing maximum carbide advantages in plants of this type.

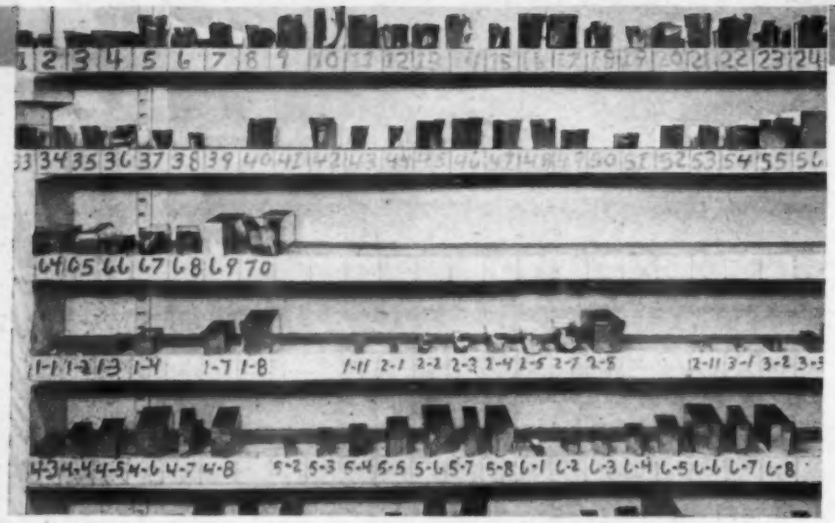
Before setting up the carbide-grinding department, planning engineers of the company determined that for best long-term results:

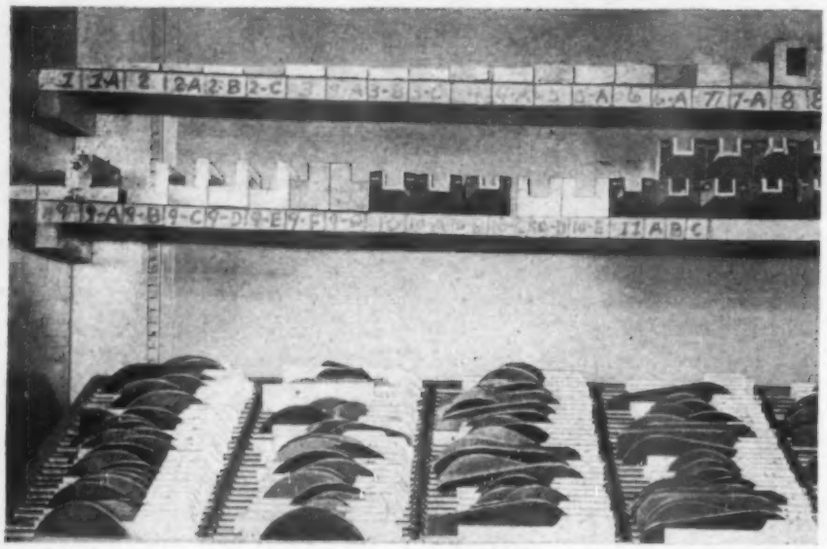
(1) the department should be as close to the center of the plant as possible and adjacent to the general toolroom and master tool crib,

(2) that equipment should be located strategically within the department so that a smooth flow of work should go from incoming stock and tips, through machining, grinding and brazing operations,

(3) that equipment and tools should be designed to reduce possibilty of human error in reproduction of tool angles and finish,

(4) that personnel or operator health and efficiency be fostered by installation of a modern dust-collecting system, either central or local,





Master tools in the top of the reference cabinet are painted red on top of the shank to insure their not being used up with stock. Tool fixtures, simulating intended lathe setting, are stored just above cam file. Each cam has a record card indicating type requirements

1-6

Part No. Standard	Holder No. 5
Tool No. 1-6	Holder (o) 0°
Tool Name Turning Tool	Height .765+-.0005
Operation O. D.	Insert #9E
Machine Lathe	Insert Left side
Use 1-7- cam	Tool L Left side
	Table 6°
	Centralize Yes

and followed through with periodic (6-mo.) physical examination,

(5) that verbal orders for carbide-tipped tools and "individual" tool angle and design requirements be eliminated,

(6) that all tool requirements, insofar as possible, be ordered from a standard catalog, designed by the carbide-control department, and the tool engineers, the number of standard types to be held to a practical minimum based upon repeat requirements in the particular plant.

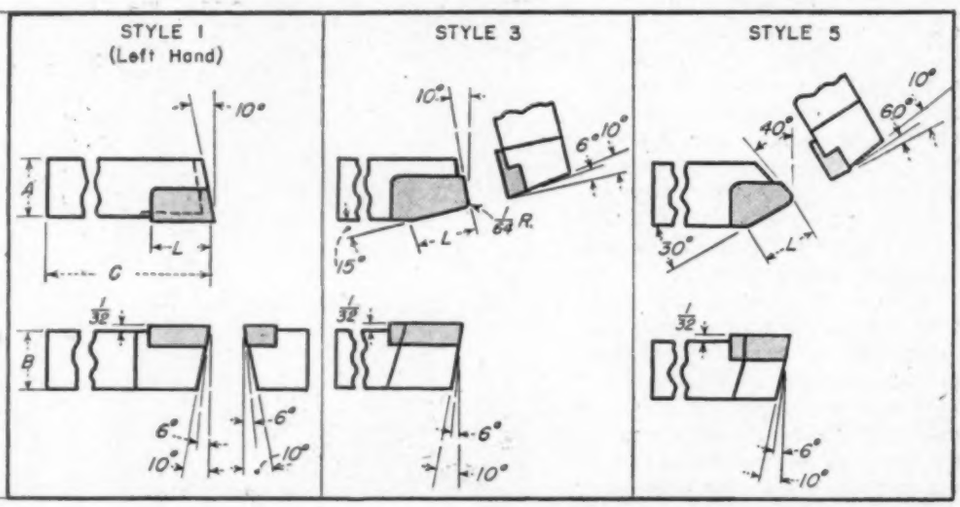
Capital-equipment cost for the carbide-grinding department might be considered high, but this is true only in first cost. To offset this high initial cost and make the most economic use of skilled personnel it was necessary to schedule tool processing on a production basis. The carbide crib was stocked well over predetermined requirements in all standard types so that withdrawal orders did not require immediate carbide-department machining and grinding operations. The operation cycle started only when a high minimum of tool replacement was needed by the crib to maintain its necessary inventory.

As a result millers, grinders, high-frequency heating units and other equipment were run on intermittent minimum-loading periods. This resulted in power saving, left personnel free to perform other intermittent departmental requirements, and assured a greater uniformity of tooling because of stabilized brazing procedure, and machining and grinding speeds and feeds.

Shank supply and storage in an accessible area was a prime requisite for full control. Sixty-four sizes of

Standardized Tool Styles

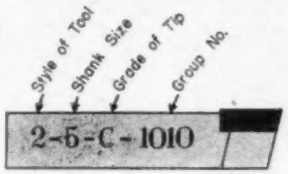
Tools standardized, shown in left-hand versions, are carried in a catalog available from all line foremen. Tables of alternate dimensions and tip grades accompany each style, enabling the operator to quickly order his replacements from the carbide crib



shank are carried in stock, being stacked in adjoining cabinet areas as "shank stock" and "milled shanks." Shanks in stock number from 1000 to 2000 of each size, increasing in the more frequently used sizes. Milled shanks are stacked according to tool number.

Adequate bench space is provided at this point in the layout to handle the tips and shank assembly onto the high-frequency brazing unit. Still in a logical flow, the tool assembly goes to the surface grinders thence to the cam grinders, profile grinders or hand grinders for grinding the desired angles and forms. All three of the processes go on at equi-distant points from the carbide tool crib.

Tool Identification Key



Grinding Method

Tool No.—Series 1 to 1000—Hand-ground tools

Tool No.—Series 1000 to 2000—Bura-way ground tools

Tool No.—Series 2000 to 3000—Form tools, machine ground

EXAMPLE—Tool No. 2-5-C-1010

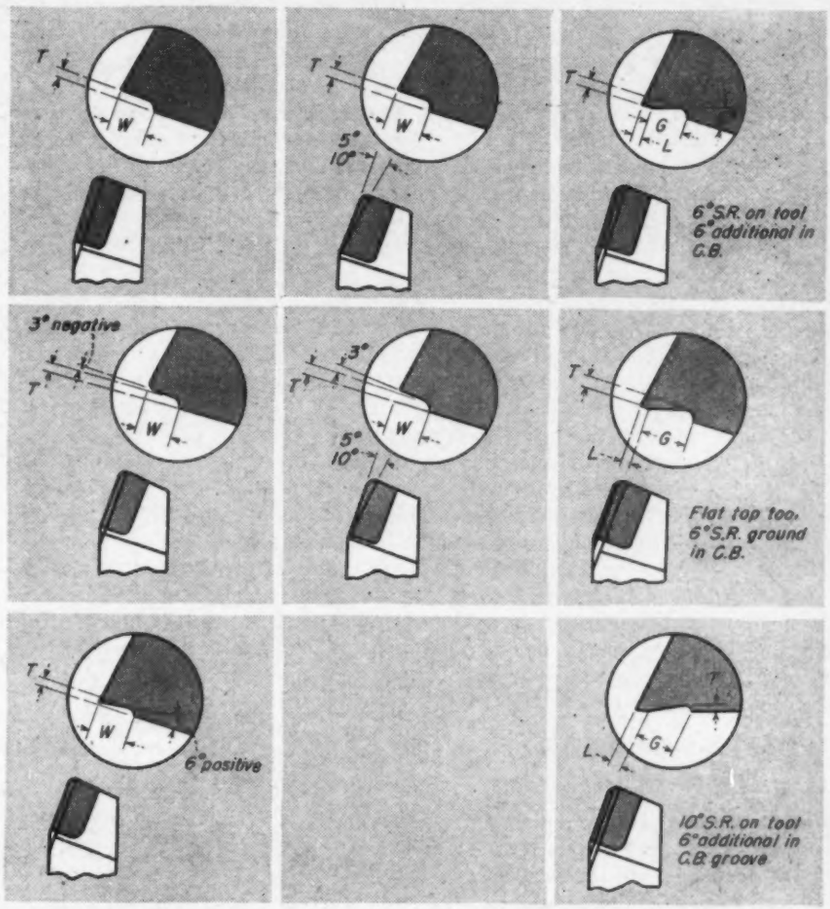
2—Right-hand turning tool

5—Shank size ¾ x ¾ x 2½ in. long

C—Carboloy Tip No. 78 (or comparative commercial grade)

1010—Tool No. group for Bura-way (cam) ground tools

STANDARDIZED CHIP BREAKERS



PARALLEL

Chip breaker (C.B.) parallel to cutting edge:
"T"—Thickness of C.B., 0.010 to 0.020 in. "W"—Width governed by "T" and feed

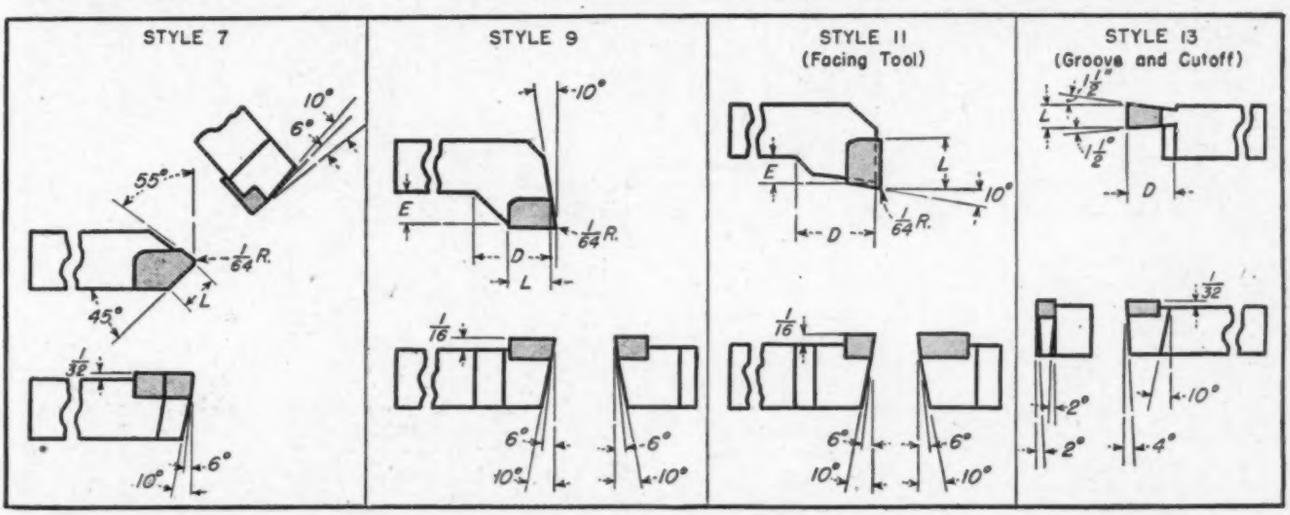
ANGULAR

C.B. at a 5 to 10° angle to cutting edge:
"T"—Thickness equal to feed up to a max. of 0.020 in.
"W"—Width at nose to be 3 to 6 times feed

GROOVE

C.B. parallel to cutting edge
"G"—Groove width to be 3 to 4 times feed. "L"—Land to be 1 to 1½ times the feed.
"T"—Thickness or depth of groove to be not over 0.010 in.

NOTE: Width "W" will be influenced by types of steel, depth of cut feeds and speeds



Tips are brazed to the shanks in high-frequency brazing furnaces, using No. 3 Easy-flo at temperatures from 1500 to 1900 F., depending on the size of the shank. Twelve standard coils are required for brazing of the tools going through the department. Carbide tips are brazed to multiple-tip tools and milling cutters by the torch method.

Control of cam-ground tools, which cover the major requirements of the plant, is a function of the carbide department and is correlated with operation of the four Bura-way grinders. An accessible reference cabinet carries master tools for hand grinding and cam design, tool inserts for locating on the same faces and angles as the actual lathe sequence, and a complete cam file in which each cam carries its record card.

All cams are now made of laminated plastic. Such cams have been found lowest in cost, more easily reproduced and have relatively long life at required tolerances.

A system of tool requistion has been worked out which, when combined with the production-type carbide-grinding department, has resulted in

1. A high degree of tool standardization.
2. Minimum machine downtime.
3. Elimination of lost time and damage resulting from delivery of incorrect tools.

Catalogs have been made up covering the carbide tool supply, as to types and sizes. These rather complete manuals are in the hands of every production-line foreman in the plant (or plants). When the operator needs or anticipates tool replacement he contacts the foreman, who in turn contacts the carbide-grinding department. A successful attempt has been made to standardize on the types of turning tools required. Instead of four or five operators ordering what amount to special tools, on individual preference, it has been possible to reduce the number to cover requirements by good operation analysis, tool design and carbide grinding control.

Standard tools are stamped according to style, shank size, grade of tip and tool number group (whether hand ground, Bura-way ground or profile ground), as shown in the accompanying tool identification key. Special tools are not made from standards and are stamped only with the tool number and grade of tip.

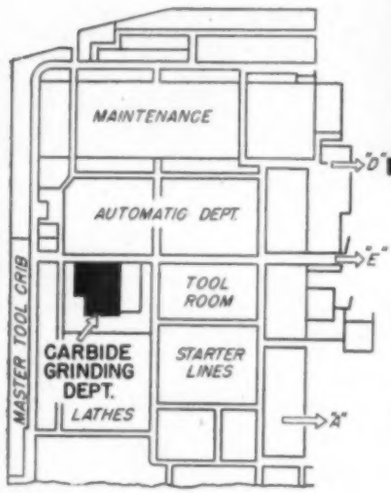
Tips are carried in stock in a variety of shapes and sizes and are identified by letters stamped on the shank. These letters are assigned to comparative grades of commercial tips in stock.

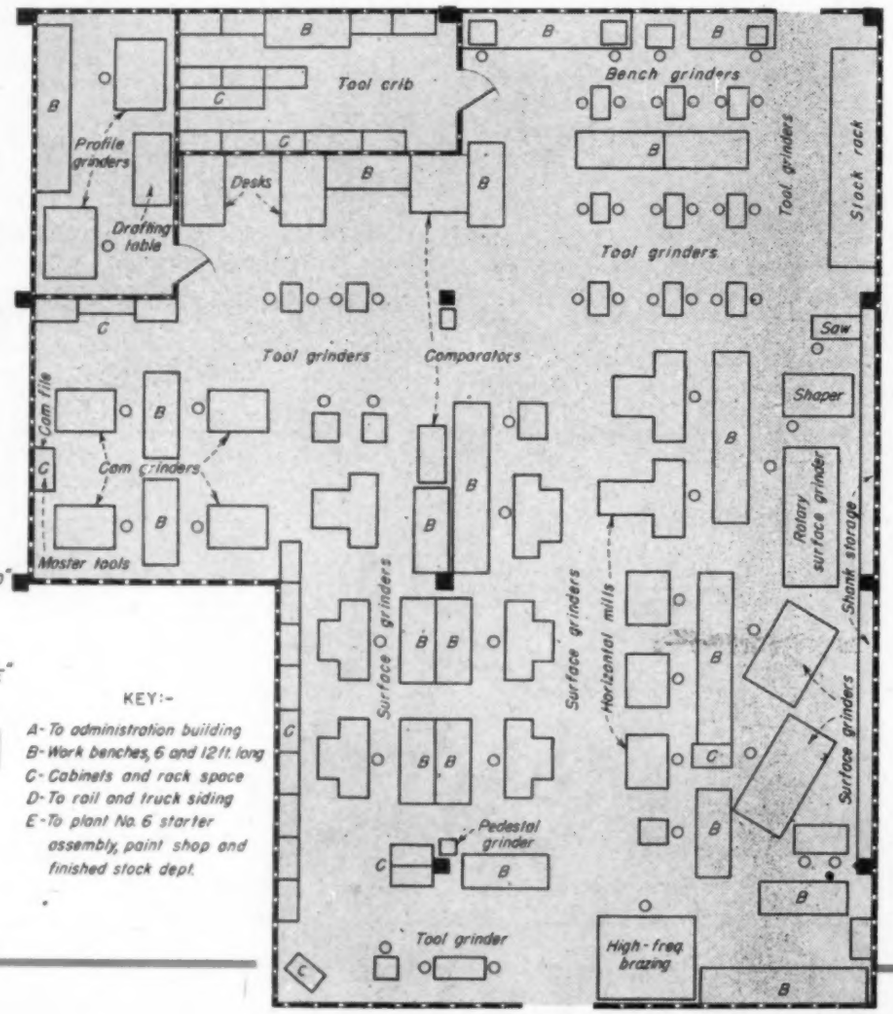
Chip breakers have also been standardized and are under control of the carbide grinding department and tool design.

The system is modified from time to time to embrace changing conditions of manufacture but even this is held to a minmum. The over-all economies of the program have been substantial, scrap has been reduced to a minimum and satisfactory performance under adequate control has led to increasing application of carbide tools in the Jack & Heintz plants. Performance made possible has elimnated or minimized price factor, and function alone is the criterion for carbide-tool application.

CARBIDE-GRINDING DEPARTMENT

Principles of work flow, usually observed in production and assembly practice, are followed in this carbide-grinding department, which is located near the center of the main plant. As the ground tools come off the hand grinders, cam grinders and profile grinders in three different areas, they are each within a few feet of the carbide tool crib





Schedules Insure Preventive Maintenance

BY RALPH H. HEBERLING, VICE PRESIDENT, EDWARD VALVES, INC.

Lubrication, inspection, and other steps in caring for 350 machines are coordinated by an over-all plant control system

CONTINUED ACCURACY and effective use of machine tools and other equipment depends upon proper lubrication, upon fairly frequent inspection of parts and auxiliary equipment, and upon replacement or adjustment of worn parts before they cause breakdowns. Lubrication and other maintenance services can be performed most effectively at regularly scheduled intervals. Planning of the necessary services and assignment of service operations to specific departments is desirable if proper maintenance control is to be exercised. A formal record of the completion of specified service operations also is needed.

Some time ago, Edward Valves, Inc., instituted a preventive maintenance control system which has paid dividends in keeping production equipment in service. This system includes periodic inspections at predetermined intervals, as well as a coded lubrication system which makes certain that each machine is properly lubricated. More than 350 major production units, mostly machine tools, receive scheduled preventive maintenance under this system.

Supervised and maintained by the methods department, this system is based upon analysis of the maintenance and lubrication requirements of each piece of production equipment. A machine maintenance analysis form (Fig. 1), made up by a methods engineer for each unit, lists all lubricating and inspection operations required. It is prepared, in each case, after study of service manuals furnished by the equipment manufacturer, and after consultation with the tool repair-shop foreman, the plant and maintenance engineer, and supervisors of the group or department in which the machine is to be used. This analysis form shows work to be done, who is to do it, frequency of each item of service and its code number, estimated time for each item, and code number of the lubricant for each lubrication operation.

An accompanying operations code lists and codes all machine-maintenance service operations. Operation numbers preceded by the letter *R* indicate items to be performed by machine repairmen under supervision of the tool repair-shop foreman. Code numbers preceded by *M* indicate items to be performed by maintenance men and by *E* items to be done by electricians, in both cases under supervision of the maintenance department foreman and the plant maintenance engineer. Only

MACHINE MAINTENANCE ANALYSIS FORM
EDWARDS VALVES, INC.

MACHINE NO. 475

MACHINE Delta Gang Drill Press

GROUP NO. 5

SERIAL NO. 40-4540, 40-4539, 40-4538

INSTALLATION DATE 12-19-45

PRESCRIPTION 3 Spindle Auto. Feeds

No	DESCRIPTION OF WORK	To Be Done By	*Frequency	Lube Code No.	Est. Time
	Fill oil cups	Operator	Twice Daily	1	
	Oil all oil holes	Operator	Daily	1	
R-21	Check oil level in feed worm reservoir, fill if necessary	Machine Repairman	2 weeks	11	0.45
R-74	Lubricate spline	"	Monthly	2	0.25
M-1	Clean coolant reservoir & strainer	Maintenance	2 Mos.		0.75
E-1	Check motor starting equipment	Electrician	6 Mos.		0.15
E-94	Check bearings on 3 motors	"	6 Mos.		0.45
E-95	Grease three motors	"	6 Mos.	17	0.75
E-96	Dismantle three motors, clean and reassemble	"	Yearly		12.00
E-78	Flush coolant pump motor & grease	"	Yearly	17	1.00

*Frequency is established on the basis of 1 - 8 hour daily shift operation. Frequency of service must be increased in proportion to the increase in operating hours.

1 Requirements for maintenance, lubrication and inspection for each machine are predetermined by a methods engineer who consults manufacturers' recommendations and plant operating personnel before making up one sheet for each piece of production equipment. This form shows work to be done, who is to do it, how often, estimated time, type of lubricant

Form EVS75 ENV. MACHINE SERVICE AND LUBRICATION CARD Machine No. 475

Machine Name Delta Gang Drill Press

No.	SERVICE DESCRIPTION	To be done by	Frequency	Lubricant Code No.
	Fill oil cups	Operator	Twice Daily	1
	Oil all oil holes	Operator	Daily	1
E-21	Check oil level in feed worm reservoir, fill if necessary	Machine Repairman	2 weeks	11
E-74	Lubricate spline	"	Monthly	2
M-1	Clean coolant reservoir & strainer	Maintenance	2 Mos.	
E-1	Check motor starting equipment	Electrician	6 Mos.	
E-94	Check bearings on 3 motors	"	6 Mos.	

2 **Service and lubrication cards** are made up for each machine, placed in a sealed transparent envelope and mounted permanently on the machine

3 **Maintenance check charts** show all machines in each group, items of service to be performed and weeks in which the operations are to be done. Two sets are made up, one for preparing maintenance schedule cards, the second (shown) mounted on plywood as a visual record. Completed operations are crossed out when weekly schedule cards are returned to the control office

electricians are permitted to work on (or even to lubricate) electrical equipment, including all motors, controls, etc.

From the machine maintenance analysis sheets, the methods department prepares machine service and lubrication cards (Fig. 2) for each piece of equipment. These cards list by name and code number all lubrication and service items to be performed on the machine. Cards are in sealed transparent envelopes placed permanently on the machines. Both sides of this card are used.

On both the maintenance analysis form and the service and lubrication cards (Figs. 1 and 2) the frequency of service listed is based on 8-hr.-day, 40-hr.-week operation. If some manufacturing units are operated two shifts rather than one, frequency of lubrication, inspection and maintenance is of course doubled.

Check Charts

Large maintenance check charts (Fig. 3) are made up from maintenance analysis sheets (Fig. 1) in two sets. One set is used in preparation of weekly maintenance schedules, the second as a record of work performed. This second set of check charts is mounted on plywood wall boards in the methods department office. It provides a visual record of performance of maintenance operations according to schedule. As service operations are reported complete each week, the square on the maintenance check chart for that week is crossed out.

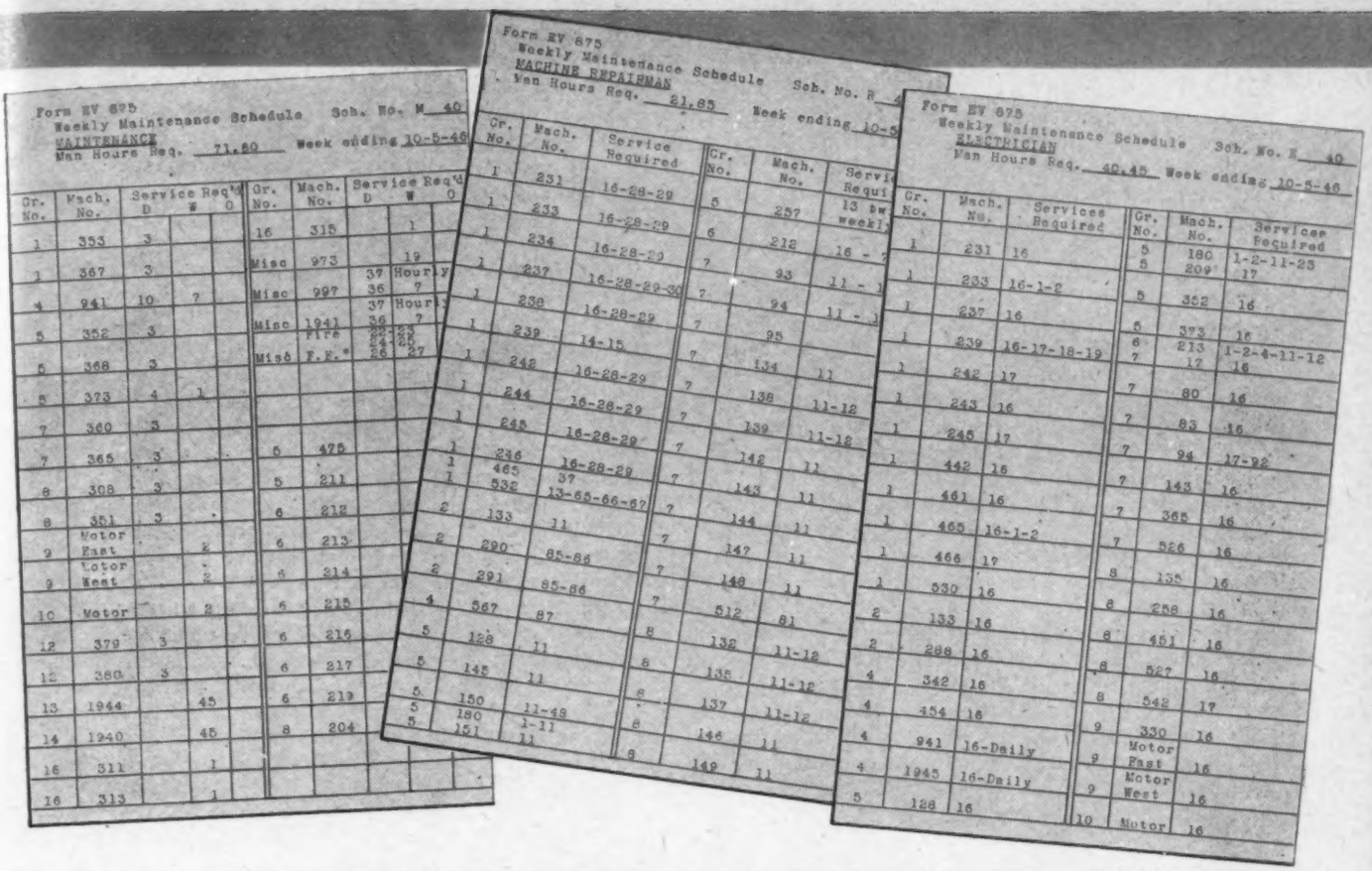
The maintenance check charts show all machines in each group, the items of service (by code number only) required, and the week in which each service operation is to be performed. On the set of charts used as work sheets for preparing weekly schedules, operations performed weekly are entered in ink, semi-annual ones with blue pencil and yearly items (if performed during the period covered by the chart) with red pencil. Yearly items to be scheduled during the following six months are entered with black pencil in the column corresponding to the one in which it will be scheduled during the next period. This aids in preparation of successive charts.

Work Balanced

Schedules are prepared so work is balanced as much as possible. When new machines, or new maintenance operations, are added, the schedule is rearranged to maintain balance. Monthly items are scheduled in the same weeks as similar operations on machines in the same group. Likewise, the cleaning of coolant reservoirs is scheduled so machines using soluble oil are cleaned during three consecutive weeks and those using oil for coolant are cleaned during the fourth week. This eliminates extra cleaning of the sump cleaner. The 78 weekly maintenance schedules (Fig. 4) for machine repairmen, electricians and the maintenance department are Dittoed at one time for the 26 weeks shown on each new maintenance check chart. These copies include all weekly services. Services performed at longer intervals are entered with pen or typewriter.

Each week, a new set of these schedules is delivered to the tool repair-shop foreman and the maintenance department foreman so each will know what work is scheduled for his groups during the following week. These cards are returned to the methods department office before 3:00 P.M. on Monday following the end of the week for which the schedule applies.

Men performing service operations, or their supervisors, indicate completion by initialing the space on the card where the operation number appears. From these schedules,


Form EV 675
Weekly Maintenance Schedule Sch. No. M 40
MAINTENANCE
Man Hours Req. 71.80 Week ending 10-5-46
Form EV 675
Weekly Maintenance Schedule Sch. No. R
MACHINE REPAIRMAN
Man Hours Req. 21.85 Week ending 10-5
Form EV 675
Weekly Maintenance Schedule Sch. No. E 40
ELECTRICIAN
Man Hours Req. 40.45 Week ending 10-5-46

4 Weekly schedule cards list service required daily, weekly and at other intervals. Maintenance schedule card (left) includes normal lubrication not performed by machine operators, as well as inspection and maintenance. Machine repair (center) and electrical maintenance (right) are listed on similar schedule cards. Space is saved by showing operation code numbers only. Cards are Dittoed for 26 weeks at a time

OPERATIONS CODE FOR MAINTENANCE CHECK CHART

Numbers preceded by R *indicate items performed by Repairmen. Similarly, numbers prefixed by* E *indicate Electricians, those by* M *indicate Maintenance men*

Typical Operations Performed By Machine Repairmen (Total = 69)

NO.	ITEM	EST. TIME — HOURS
R-1	Check machine alignment and gibs	1.00
R-2	Check machine for level	1.00
R-11	Check oil level in head reservoir, fill if necessary	0.15
R-13	Check oil level in hydraulic reservoir, fill if necessary	0.15
R-17	Check oil level in spindle reservoir, fill if necessary	0.15
R-28	Fill feed change oil reservoir	0.20
R-32	Drain head oil reservoir, clean and refill	0.50
R-38	Drain main oil reservoir, clean and refill	0.50-2.00
R-43	Drain reduction gear oil reservoir, clean and refill	0.50
R-67	Fill ways lubricator	0.25

Typical Operations Performed By Plant Electricians (Total = 74)

NO.	ITEM	EST. TIME — HOURS
E-1	Check motor starting equipment	0.15
E-11	Grease main motor	0.25
E-16	Oil main motor	0.15
E-23	Dismantle main motor, clean and reassemble	4.00-8.00
E-36	Flush grinder motor and grease	1.00
E-50	Check grinding wheel motor bearings	0.15
E-54	Oil linkage of solenoid motor brake	0.15
E-56	Clean and inspect motor operated valve	0.25
E-62	Dismantle tool slide motor, clean and reassemble	8.00
E-70	Oil hydraulic pump motor	0.15

Typical Operations Performed By Maintenance Men (Total = 33)

NO.	ITEM	EST. TIME — HOURS
M-1	Clean coolant reservoir and strainer	0.75-16.00
M-4	Clean coolant strainer	0.25
M-7	Clean machine	4.00
M-10	Clean belt	0.25
M-12	Check brake cylinder, fill if necessary	0.25
M-13	Clean air cleaner	0.25
M-15	Fill transmission	0.25
M-17	Clean and repack wheel bearings	1.00
M-24	Check sprinkler shut-offs	2.00

the maintenance check wall charts are marked to indicate completion of service items indicated.

Time estimated for each maintenance inspection, lubrication or scheduled repair operation, shown in the accompanying table, is used only to help the methods engineer prepare balanced schedules. Each weekly maintenance schedule card, for example, shows total estimated manhours for work listed on it. This helps the foreman schedule work.

Before this system was installed, one oiler was employed full time to lubricate machine tools throughout the plant on a hit-or-miss schedule. Now, he spends half his time lubricating machines and the other half as a handyman.

Preparation of maintenance check charts requires takes the methods engineer about two days at the start of each 6-mo. period. In addition, a methods clerk spends about two hours each week preparing the weekly maintenance schedule cards. Thus, system operation requires only about 150 hr. per year on the part of the methods department. Necessary variations in maintenance schedules, brought about by machine breakdowns, etc., are taken care of by a member of the methods department who authorizes changes in the weekly schedule cards.

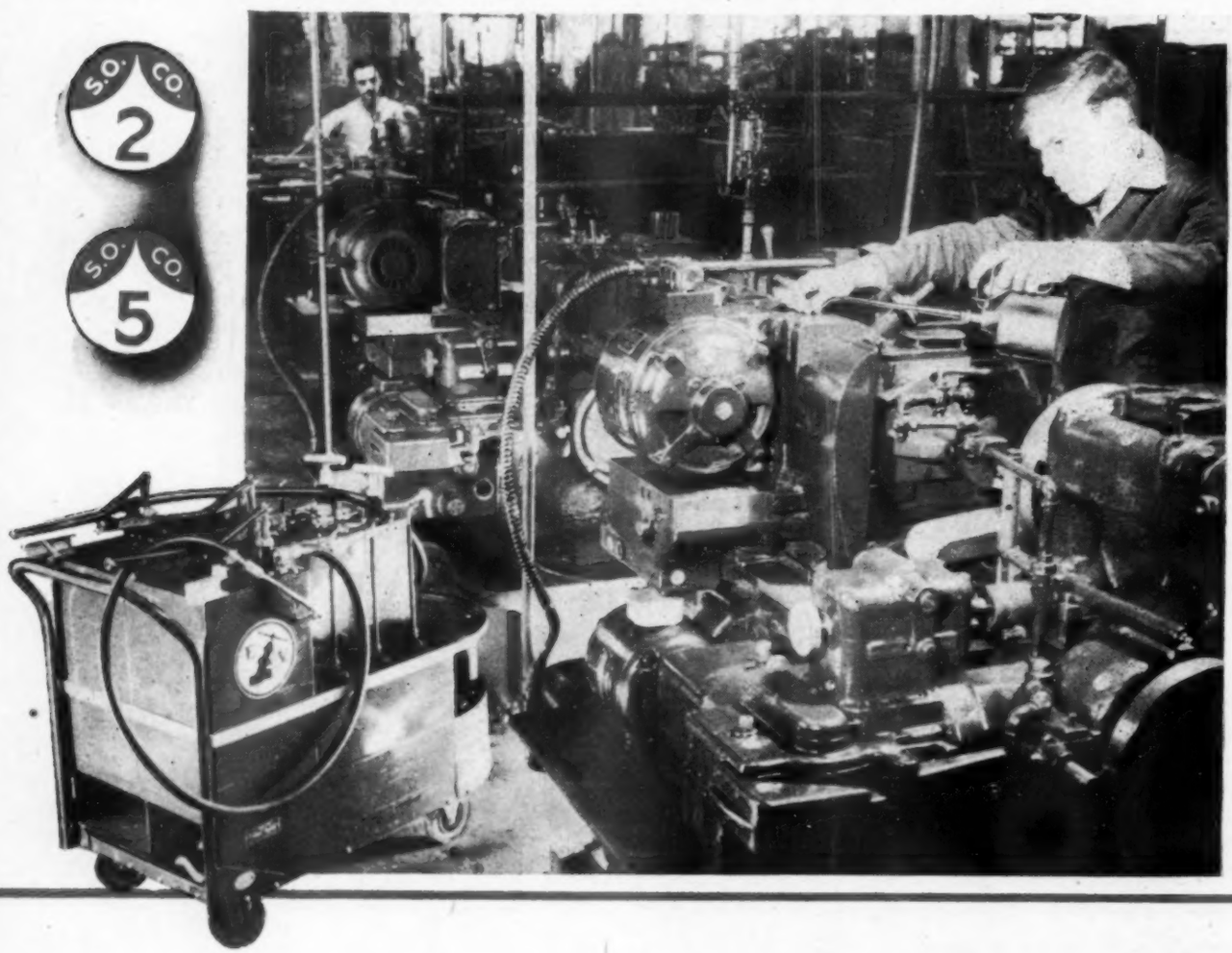
The methods department, in consultation with the plant superintendent, the tool repair-shop foreman, the plant engineer and the purchasing department, determines from manufacturers' recommendations the proper lubricant for each application and prepares code lists of lubricants to be used. All equivalent lubricants are listed under the same code number. In each group, one or more lubricants may be indicated as preferred. The purchasing department orders preferred lubricants under each code number, except when authorized by the purchasing agent to substitute another. No substitutions between code numbers are permitted except as authorized by the methods department.

Numbered decalcomania transfers from Standard Oil of Indiana, placed on machines at each point of application, show code number of the lubricant to be used at that point. Red-and-yellow decals show operator serviced points, blue-and-yellow decals are points serviced by maintenance, tool shop, or electricians.

The receiving department paints the proper code number on containers of all lubricants when received. All lubricant containers and dispensers in the plant are also coded.

The oiler-handyman who takes care of most lubricating operations not performed by individual machine operators has a lubrication cart (Fig. 5) on which containers of the most commonly used lubricants are kept. Containers are refilled from drums or other containers in stores. This man also uses the sump cleaner with which coolant sumps in machine tools are cleaned and refilled regularly.

5 **Lubrication cart** used by the plant oiler-handyman carries all equipment and supplies for normal machine lubrication. He also uses a portable sump cleaner when changing cutting fluids in machine tools. Lubricant requirements and frequency are shown by coded decalcomanias



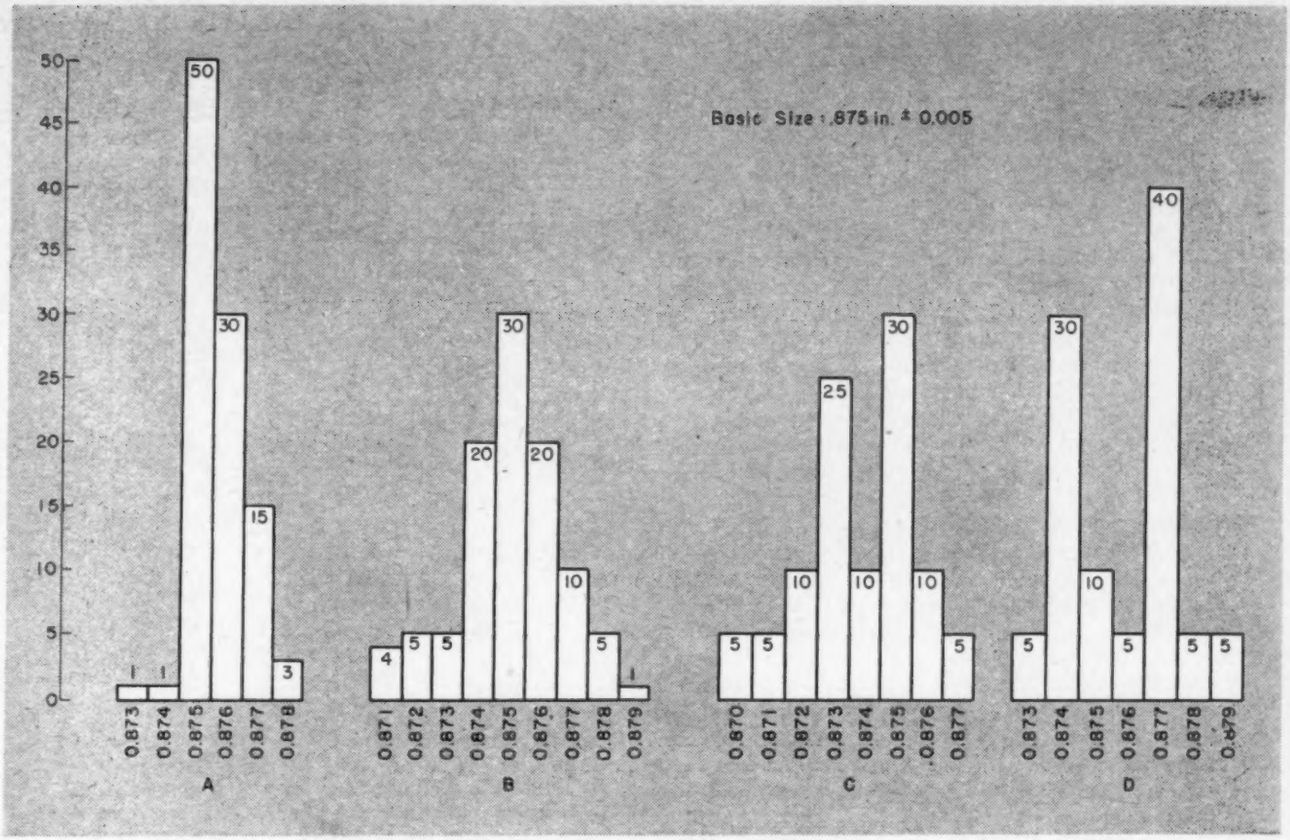


Fig. 7—The four frequency histograms show the frequency distribution of 100 parts from four separate suppliers. Graphs A and B show excellent quality control. Graphs C and D are bimodial distributions in which cells with high frequencies are separated by cells with lower frequencies, probably the result of mixing separate runs

Quality Control Aids Supervisors . . . 3

Interpretation of Chart Data

Proper interpretation of chart data permits taking necessary preventive and corrective action and provides multiple benefits

BY DAVID T. ARMSTRONG

THE CHIEF PURPOSE of establishing a quality-control chart system is to facilitate necessary preventive and corrective action for increasing production and decreasing downtime for machines.

The quality-control system is not a wand, waved by a fairy godmother, which will automatically improve production, eliminate rejected pieces and keep machines operating at top capacity without the cooperation of management.

The best quality-control system will be useless when management does not take the proper steps to make changes suggested by operation of the program. The quality-control program simply provides the data, on the basis of which management is expected to make proper decisions.

Quality-control data or charts are like road maps. Some men can go anywhere in America with a map and some can't be sure whether to make a right or a left turn to get on to route 46 where it crosses route 1.

Whoever does the quality-control work in the shop should be an individual with a ready facility for understanding and interpreting data. It is not more difficult than reading a blueprint; in fact, from many points of view it is simpler.

The average shop man knows the problems in his shop and can interpret data dealing with the manu-

factured product much better than he can understand the explanation in some general text on chart and graph interpretation which does not deal with the kind of work done in his shop.

What use can be made of such data in a shop? Suppose that the work produced on a certain machine for a period of a month shows that pieces are being machined within limits of 1.000 in. ± 0.001 and overall tolerances call for 1.000 in. ± 0.0025.

Tolerance Change Desirable?

It is logical for the foreman or supervisor to call this fact to the attention of the engineers and let them decide whether the product can be improved by reducing the tolerances to 1.000 in. ± 0.0015. Or it may not be possible to produce to a tolerance of 1.000 in. ± 0.0025. The foreman might then ask the engineers to increase the tolerances to 1.000 in. ± 0.005.

During the war we were producing parts for a sub-assembly and holding them to 1.000 in. ± 0.001 when we could just as well have produced to 1.000 in. ± 0.005. Most of the reject pieces would have been usable, but were not submitted because they did not meet blueprint tolerances and inspection would not pass them. Now that cost-plus is gone and it is every manufacturer for himself in a highly competitive system, these little items have significance.

There is excellent psychological value in having the quality-control chart posted on a convenient spot on the machine. The operator wants to know how well he is doing. He does not have to be a quality-control engineer to look at the chart and see how things are going. He does look at the chart and wonder what he can do to produce as large a number of good pieces as possible.

Fatigue Plays a Part

There is another consideration. In the morning an operator may produce accurate work because he is full of pep and puts the right amount of feel into the handwheel or carriage feed.

But later in the day, as he suffers from fatigue, he may not put the same amount of force into holding the handwheel in place, as a result of which he may produce oversize or undersize pieces. If the charts show such a condition, he knows it at once and can then try harder to keep the pieces inside control limits. This boosts operator morale—he feels himself a part of the scheme of things—he belongs.

The charts are valuable to setup men, foremen and supervisors, as well as to operators. Unusual conditions show up quickly in averages and in the trend of averages. Thus, it is possible to employ preventive techniques and produce a maximum of acceptable pieces.

Whenever sample pieces measured show a machine to be out of control, the foreman can study the operation and make necessary corrections on the basis of his diagnoses. Sometimes the foreman may discover that a machine is not in first-class operating condition and needs repair. Or he may find that work methods are such as to preclude high-quality work and require retraining of operators.

Multiple Benefits Possible

Of the many advantages of a well-planned quality-control program, the following are considered the most important:

1. It is possible to obtain first-hand quality-control data that will indicate which operators are producing consistently high-quality work. When a higher-rated job is to be filled, operators who are doing excellent work should be considered favorably. Upgrading, of course, should not be done solely on the basis of percentage of high-quality work produced, but it should be one of the factors considered.

2. Many authorities believe that inspection can be quite materially reduced as a result of intelligent application of quality-control techniques and procedures. Quality-control properly administered insures continued production of the quality desired during the manufacturing process.

Because of these controls, it is possible to make adjustments and corrections before spoiled pieces are produced. Intelligent study of the charts for a given machine will indicate trends of production for that machine which, if permitted to continue, would eventually result in spoiled and reject work.

3. Quality control will facilitate production, instead of retarding it. For example, 100% inspection is costly. As a result of known statistical techniques, it can be shown that the same results can be obtained with about 20% inspection as would be obtained with 100% inspection. The utilization of this percentage inspection technique cuts down inspection time to one-fifth that for 100% inspection and gives as good end results.

4. A good quality-control program permits a check of the inspectors who compile the data. Every shop has reject work which is traceable to faulty inspection or carelessness on the part of the inspector.

If inspectors fail to catch defects in time or to analyze properly the trend of a machine in time to prevent spoiled work, it may be desirable to drop them as inspectors or transfer them to a department where they will have fewer or different responsibilities.

5. Quality control helps the purchasing department. Suppose it is found, that, out of ten suppliers of parts, two have a large percentage of defective parts. The purchasing department can be advised that parts from those suppliers should no longer be contracted for because they contain too large a proportion of defective pieces.

Bell Aircraft made an excellent study of this problem and found that, for over 35,000,000 parts purchased from over 450 different companies, less than 2% were defective. But further analysis of the data accumulated revealed that while almost 300 companies produced parts less than 2% defective, more than 30 companies produced parts at least 50% defective.

If such studies continue to be made and used as a basis for purchasing, small-lot suppliers will be forced to install adequate quality-control systems or more exhaustive inspection than they at present have.

Fig. 7 is an analysis of the distribution over the tolerance range of parts from four different suppliers. Suppliers of distributions A and B has good quality control, whereas graphs C and D show bimodial distributions.

6. Parts that show a tendency to run to the upper or lower limit can be given special statistical study to determine recommended changes in procedure, tolerance or tooling.

7. Quality control with the addition of size sorting permits high-quality assembly in matched parts.

For example, if pistons for a refrigeration compressor are machined to 1.1250 in. ±0.0002, and cylinders are machined to 1.1252 in. ±0.0002, piston sizes will vary as:

L 1.1248
M 1.1249
N 1.1250
O 1.1251
P 1.1252

Cylinder sizes will likewise vary:

L 1.1250
M 1.1251
N 1.1252
O 1.1253
P 1.1254

By marking special pairs with letters like L, M, N, O and P, it is possible to produce compressors with not greater than a tolerance of 0.0002 in. between diameter and cylinder bore. Where such a system is not used, sloppy fits may result by matching, for example, a 1.1248-in piston with a 1.1254-in. cylinder.

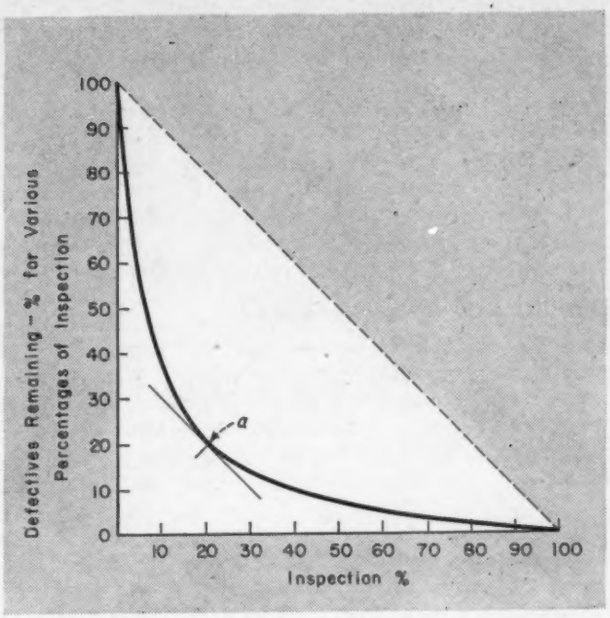


Fig. 8—At the point of diminishing return a, 21% inspection of a sample lot will remove about 80% of defective parts. One-hundred percent inspection theoretically removes all defective parts but is too expensive and unnecessary

How To Measure

Quality control depends to a large extent on the efficiency and accuracy of measuring instruments used to indicate sizes of sample pieces. It is impossible to control the quality of a product unless measurements are made accurately and quickly. With respect to the kind and quality of measuring devices required for a good quality-control program, the following points are important.

There is great need for direct-measuring instruments. External cylindrical surfaces can be accurately gaged by direct methods, but internal measurements of screw threads or measurements of the hexagonal of a blind broached hole are not yet subject to direct-measuring techniques.

There is great need for speedy methods of measuring, gaging and inspecting. Some measurements require too much time or involve cumbersome and slow procedures. Manufacturers of measuring devices are much concerned with this point, namely, "Will the instrument permit economical gaging of the product for which it is intended?"

There is great need for objective, foolproof gaging instruments. Many instruments in common use are not designed to provide sufficiently adequate objective precision measurements. Use of such instruments permits too high a percentage of error in the hands of an ordinary inspector or even in the hands of an experienced toolmaker.

An excellent study of accuracy of measurements obtained with precision instruments used by reasonably well trained inspectors was made by two competent men in the field[1].

In this study, inspectors in two different plants were examined. Each man was examined on the basis of his ability to use the instruments he actually spent most of his time working with.

Each man examined was asked to make five separate measurements of one piece of work and then to record his best judgment of the actual dimension of the piece. The instrument which the men used had been tested for accuracy just prior to the experiment. The actual or "true" measurements of the pieces were found by the use of the most modern, highly refined, ultra-precision methods, with Johansson blocks.

"Feel" Plays a Part

As the element of "feel" plays an important part, it was desired to determine the ranges within which it influenced the measurement. Results of this experiment were startling. Among the more interesting were the following:

Using a 1-in. micrometer, accurate to 0.0001 in., only 43% of the inspectors obtained a reading within the established tolerance of 0.0001 in.

Using a 2-in. micrometer, only 17% of the inspectors obtained a reading within the established tolerance of 0.0001 in. This means that 83% of the inspectors examined were not capable of making measurements with a micrometer that would be accurate to 0.0001 in. When the piece to be measured involved the use of a 6-in. micrometer, 89% of the inspectors tested were unable to set down a measurement that was accurate to 0.0001 in.

Inspectors Not To Blame

It is not possible to charge this off to new inspectors or to poorly trained inspectors. As a control situation, 45 toolmakers of long experience were tested by the same methods and the results generally speaking were not much better. The larger the piece to be measured, the less accurate the measurement set down by the person attempting to make the measurement.

When the measurement was approximately 0.250 in., about 75% of the toolmakers were able to come within 0.0001 in. of the true measurement. But when the part was 3.000 in. in size, only slightly over 12% of the toolmakers were able to come within 0.0001 in. of the true size.

Even on the same piece, the measurements made at different times in the same morning by the same man with the same measuring instruments may not be the same. This point was discovered by the author as a result of an experiment on this problem.

There are too many uncontrollable variables, one of the most important being the matter of "feel." As these

[1] *Lawshe, C. H., Jr., and Tiffin, Joseph. "The Accuracy of Precision Measurement in Industrial Inspection." Journal of Applied Psychology, Vol. 29, No. 6, Dec., 1945, pp. 413-419.*

facts are known or suspected to be true by a majority of shop men, management can well use only measuring instruments and techniques that will give the same identical reading at different times for the same piece.

Precision Gaging Needed

Cylindrical pieces, which may be rolled under a dial indicator that measures in tenths, are among the easiest to gage with high precision. For external threads, the bench comparator is probably the only type of instrument that will measure threads accurately enough for genuine statistical-quality-control purposes. Blind holes, blind hexagons, internal threads and grooves, either helical or ring on an internal bore, are still more difficult to gage.

This is a problem to which the makers of gages are bending their efforts. First they have to design a gage to take care of every common need for accurate precision measurement and then persuade shop men to use these better type gages. That is a difficult problem. But something has been done toward its solution. The Germans faced the problem of objectivity of measurement and went far toward solving it to achieve foolproof objective measurements from the slave labor they used during the war.

Percentage Inspection Technique

Managements, stimulated by the cost economies possible in the mass-production techinques, have given considerable thought to the problem of establishing quality control in as many fields as possible. To be acceptable in modern industry these controls must be economical, easy to operate and able to demonstrate their proficiency in maintaining high standards of production in meeting specifications.

In a large-scale, over-all search for the fundamental causes of variations in manufactured products, techinques have been worked out and perfected to establish within reasonable limits the number of pieces that will vary from a given standard.

While it is generally the function of engineering to establish tolerances and quality of finish, it is the duty of the inspection department to determine in which cases these specifications have been adhered to and to reject parts that do not meet these specifications.

Some products require 100% inspection, because a part totally or only partially defective may ruin a whole assembly. Balls for ball bearings are an example. Every ball must meet the exacting tolerances or the bearing will not function properly.

Ball bearings can be subjected to 100% inspection. But class 2 fit stove bolts in ¼-20 size are produced by millions and sold at a low, competitive price. Obviously, it is neither possible nor desirable to subject them to 100% inspection, as the labor cost would be too great.

As a result, techniques have been developed and perfected to take random samplings and to determine by statistical methods how many rejects are likely to be in a given batch and so fill a customer's order for 10,000 pieces plus a number of pieces equivalent to the number of rejects expected in 10,000 pieces.

Percentage Sampling

An important application of the sampling method is in the inspection of those products, the true characteristics of which can be revealed only in destructive tests. Such tests might be the life in hours of a fluorescent lamp, the wearing qualities of leather in a given type of shoe or the number of 50-cal. bullets that will go off when struck with a firing pin.

Inspection and testing of such manufactured products can be done only on a sampling basis. The sampling basis should be just large enough to indicate practically the same results that 100% inspection would give.

In a search for techniques to attack this problem, a sampling procedure was devised for elimination of defectives. According to this method, percentage of inspection necessary to reveal the permissible number of defectives is set up. Sample lots are then inspected in accordance with this techinque at a considerable saving of both time and money.

The graph in Fig. 8 shows the percentage of defective pieces that will be in a sample lot when that sample lot is subjected to inspection varying from 0 to 100%.

One-hundred percent inspection theoretically removes all or 100% of the defective pieces from the sample if inspectors make no errors. If half the pieces in each lot are inspected, the percentage of defective pieces removed from the sample lot is somewhat lower. Obviously, both these methods are too time-consuming and too costly if they can be avoided.

Thus, it becomes desirable to find a percentage of inspection that will remove the greatest practical percentage of defective pieces from a representative sample lot. Inspection of the curve shows that approximately 21% inspection of a sample lot will leave about 20% of the defective pieces in the sample. There is a good mathematical reason for selecting point *a*, which is the point of diminishing returns. At this point, the slope of the curve, as indicated by its tangent, is less than the slope of a straight line running from 100 to 100%.

It is never necessary in inspecting sample lots of the type under discussion here to carry such inspection beyond the point of diminishing returns, because the savings effected would not warrant the expense of that inspection.

Suppose 100% inspection of 50 lots of 100 pieces each reveals the following data:

42 lots have no defective pieces
1 lot has 1% defective parts, or a total of 1 defective
3 lots have 2% defective parts, or a total of 6 defectives
1 lot has 3% defective parts, or a total of 3 defectives
1 lot has 4% defective parts, or a total of 4 defectives
1 lot has 5% defective parts, or a total of 5 defectives
1 lot has 6% defective parts, or a total of 6 defectives

This gives a total of 25 defective pieces in 5,000 produced pieces, or 0.5%. One-hundred percent inspection of future similar samples would be too costly to reveal the 0.5% defective pieces. Therefore, the 21% inspection of the entire lot is utilized and 21 pieces out of each 100 are inspected. If the number of reject pieces found is greater than the number permitted for this percentage of inspection for the sample lot, the entire lot may be inspected and changes made in the manufacturing process to correct the cause of defective parts.

The concluding part of this series will be published in a forthcoming issue.

ROUND TABLE

Can You Aid the Lemon?

"I see you finally got the Lemon, Al. That guy has worked in every department in the plant, and nobody wants him. How did you get stuck with him?"

"Well, Ed, to tell you the truth, I went into this one with my eyes open. I know what they say about him, and I know that some one was unloading when he was passed on to me. I probably could have objected—but it was one of those days when everything was clicking and I was in a good humor. So . . . I decided to find out if this guy is actually as useless as everybody claims."

"But, Al, that guy has been bouncing from department to department for the past three years—and about two or three days after every transfer, new plans are underway to unload him!"

"That's just the point, Ed. I think someone has to make the decision one of these days, whether we can find a place for him or let him go. He has stuck around until he's got seniority, and every day he gets in from now on makes it more difficult to let him go. I think I know why he has not been released before, because transfer is the easy way out. To get him out means somebody has to furnish justifiable evidence—and that means building up, in writing, a case that will stand up."

"Listen, Al, I'll go along with you on the reason why he is still here. But why take on your shoulders the responsibility for straightening him out or putting through a release?"

"Well, Ed, I don't know, except this guy is kind of a challenge to me. I'm going to start out and see if I can't get next to him. It seems to me he must have something on the ball or he wouldn't have been around three years. Most of the guys hate to fire a guy, but he wouldn't last that long, even with the buck-passing that's been going on unless he has something."

"But, Al, everybody but him can't be wrong! It isn't the same as if he had just failed once. He hasn't been any good in any job."

"I know, Ed, and I may end up behind the eight ball. But I had a boss once (and he was tops) that told me that every time he had to fire a man he felt as if he had failed. He always went on the premise that there is some way to get next to every man."

"Yeah, Al, I know that some men have been failures under one fellow and turned out to be good under another. But this guy has made trouble on every job he has been on."

"That, Ed, is the point that interests me. I naturally checked up on him—and I have yet to hear that he does not have ability. They all say he is a trouble-maker, but I have found out that a man will work for you just as hard as he will against you—*if you get him on your side.* So I am going to put him on a job where he can't make too much trouble and try responsibility and praise. That might steer him into picking a fight with his job, not with the boys or me."

"Well, Al, maybe you have something. I'll bet you probably won't have a dull moment!"

"Tell you what I'll do, Ed: If I don't make out all right, I'll transfer him to you."

"Hey, now, Al, just a minute——"

IS IT WORTH *the time to try "to pick specks from rotten apples"—if you're not sure they're rotten? Is the foreman who tries it merely breeding trouble for himself? Your experiences or ideas will be welcomed by others. Discussions of earlier topics appear on later pages.*

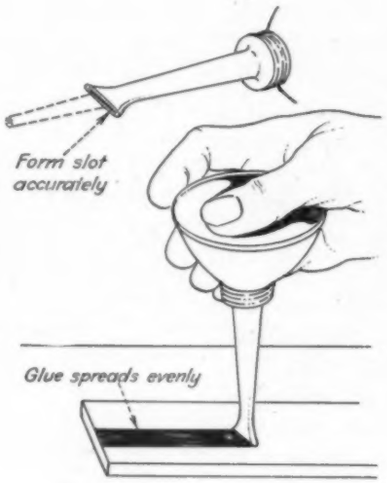
Short Cuts FOR THE SMALL SHOP

BY A. H. WAYCHOFF

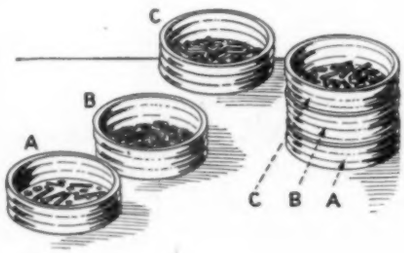
BLOW TORCHES are less likely to tip over and start a fire if fitted with a detachable base when in use. To make the base, get two strips of spring steel about 12 in. long, and punch a 3/16-in. hole at the center of each strip. Then form two opposed hooks in each strip so the hooks will fit and grip the base of the blow torch. Rivet the two strips together and then snap onto the skirt of the blow torch, as shown. When not needed, the base can be partially folded up and stowed away in tool case or bag.

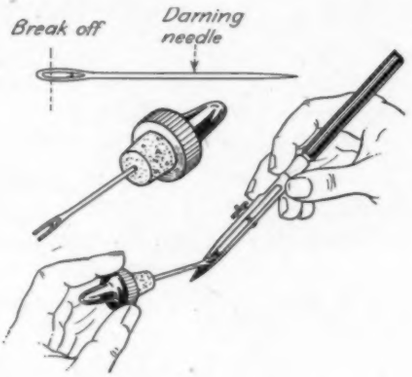
DOUBLE-PURPOSE soft hammers are easily made from aluminum pistons used in motorcycle and other small internal-combustion engines. Set a handle in the wristpin holes, then pour the desired quantity of molten lead into the piston cavity. If filled with lead, the hammer will serve two purposes: the lead face can be used the same as any lead hammer; the piston dome of high-grade aluminum will better resist battering when striking iron or steel, but will not deface the work.

GLUE can be spread evenly and placed in cracks with a modified oil can. Cut off the spout where it is about ¼ in. in diameter, and flatten carefully, using a piece of 20-gage strip or an old hacksaw blade as a mandrel or horn. Fill the can with glue, replace the spout. Draw the applicator along the surface to be glued, while "pumping" the can. The glue will come out of the orifice under good control. Besides, the narrow opening serves as a good seal—the glue dries there to exclude air, but can be softened with water.

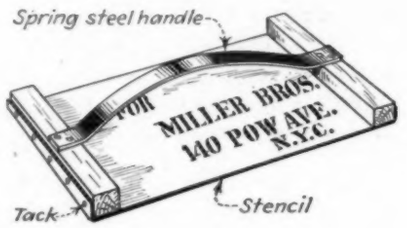


TINY PARTS are kept safely and in order of dismantling and assembly of a mechanism by use of the following system: Procure a series of jar lids. When the first sub-assembly is dismantled, place the screws and other tiny parts in lid *A*. Similar parts from the next sub-assembly go in lid *B*, which is then stacked in *A* and given a quarter-turn to wring. When all necessary lids have been filled, insert an empty lid in the top of the stack. When ready to assemble the mechanism, remove lids from the stack in the order that each sub-assembly is put together. In this way, all small pieces are kept together and in the order of their use.





INKING of ruling pens can be done without overcharging by using a darning needle instead of the usual quill. Snap the end off the eye of the needle, push the sharp end into the cork. The broken eye of the needle picks up just about the right amount of ink, holds it safely without dripping, deposits it instantly when touched to the ruling pen.



STENCIL HOLDERS have proved valuable in one shipping department, to insure that addresses and markings are not smeared or uncompleted by hard-pressed personnel. The holder consists of two thin wood strips fastened to a piece of spring steel ¾ in. wide by 1/32 in. thick. The stencil is tacked to the wood strips, applied to the box or barrel, and slight pressure on the spring holds the stencil tight and flat against the container while the color is brushed on.

Shall We Cling to the Inch?

BY FRED H. COLVIN, EDITOR EMERITUS

After a lifetime on the other side, Mr. Colvin is changing his mind. He presents some of the arguments for the metric system and some of the problems

WITH all the commendable work that has been done in simplifying as well as standardizing machine parts, we may be approaching the time when we must seriously consider a very controversial phase of the subject—the basis of our measuring units. Only men past middle age probably recall the bitter battles attending earlier attempts to have the metric system made the basic measurement and to compel its use in all government supplies. Frederick A. Halsey, backed by the entire machine-tool industry, fought, both in the columns of *American Machinist* and in Congress, for retention of the English standards. Fred J. Miller, Dr. Stratton of the Bureau of Standards, and others argued the advantages of the metric system, but were decisively defeated. A second attempt, in the early part of the century, also failed.

But in spite of all our logic as to the advantages of the English inch as the basis of measurement in machine building (and it is a most convenient unit when subdivided into fine decimal parts), the metric units have crept into our shops as well as into many of our laboratories. For this kind of work, the inter-related units of the metric system have many advantages, even though it is a foreign language to many in strictly mechanical fields.

Great Britain, the home of the English system of measurement, long ago began to use millimeter sizes for its British Association screw thread, both for diameter and pitch. (This should properly be called "lead" because it is the distance between threads instead of the number of threads per unit of measurement, as in the English system.) In addition, this thread has the unusual angle of 47½°, this being developed by Prof. Thurg of Geneva for the Swiss watch industry, and has also been used to some extent in this country by watch factories.

Watch and instrument makers in the United States are also using, and standardizing, a system of screw threads with diameters, threads and tolerances in millimeters, with translations into inches. Motor-car and airplane-engine builders are using spark plugs with metric threads, new standards now being announced by the SAE. Some British automotive builders are also using metric dimensions in other parts of their engines and possibly elsewhere, this presumably in the interest of Continental and other trade. And look at our ball-bearing dimensions!

We formerly boasted that as long as Britain and the United States adhered to the English inch as a basic measurement, it mattered little what the rest of the world used, as our two countries built the great majority of machine tools and other machine equipment. With both Great Britain and ourselves using more and more of the metric units, our arguments as to the superiority of inch measurements are beginning to fall rather flat.

World Preference

We are still the world's largest builders of production machinery and are likely to remain so. But with the unmistakable trend toward metric measurements, it may be wise to give the matter far more careful consideration than we have done in the past. There are few countries on the globe which are not, theoretically at least, on a metric basis.

There seems to be no vital reason why we should have adopted metric spark plugs in our internal-combustion engines. It would have been easy to make a similar plug of almost the same dimensions to inch measurements. By adapting the metric we gave the advocates of that system one of the best arguments for its general use. They can say, and with logic, "Why not use the same system on the other parts and avoid the confusion due to having two standards of measurement?" Perhaps the greatest argument would be that of making it easier for us to capture a larger share of foreign markets. The smaller manufacturers of other countries now find it easier to secure orders from abroad than do ours—because other countries use their standards of measurement.

This is a problem that requires long and painstaking study; it is a serious undertaking to change from one system to another. It is not a mere matter of translating from inches to millimeters by multiplying by 25.4, the accepted conversion relationship. The actual ratio runs into a long decimal which cannot be dropped if accurate tolerances are to be maintained. In fact, many consider the acceptance of the 25.4 ratio as altering the standard.

New Drawings

Should it be decided to take the drastic step of abandoning the inch for the metric system, most manufacturers will doubtless prepare new drawings, giving dimensions in even millimeters instead of trying to handle dimensions with a long string of decimals. The new drawings need not be materially different from those now in use and can maintain nearly the same proportions, but it will mean new drawings, new fixtures, tools and gages and run into millions. Whether it will be worth the cost or not depends on how much new business may result, or even how much of their old business can be retained without it.

It is not a question of the relative merits of either system. That leads to endless and largely futile argument. The problem is rather whether it will pay to have a uniform system of measurement not only for its effect on trade, but also to prevent loss and confusion due to having two systems in use.

Nor can we rely too much on logic. We have a perfectly good decimal currency, coupled with a system of weights and measures that is illogical and confusing. Britain is using the metric or decimal system more largely than we are, but clings to a currency as illogical as our pints, rods and chains.

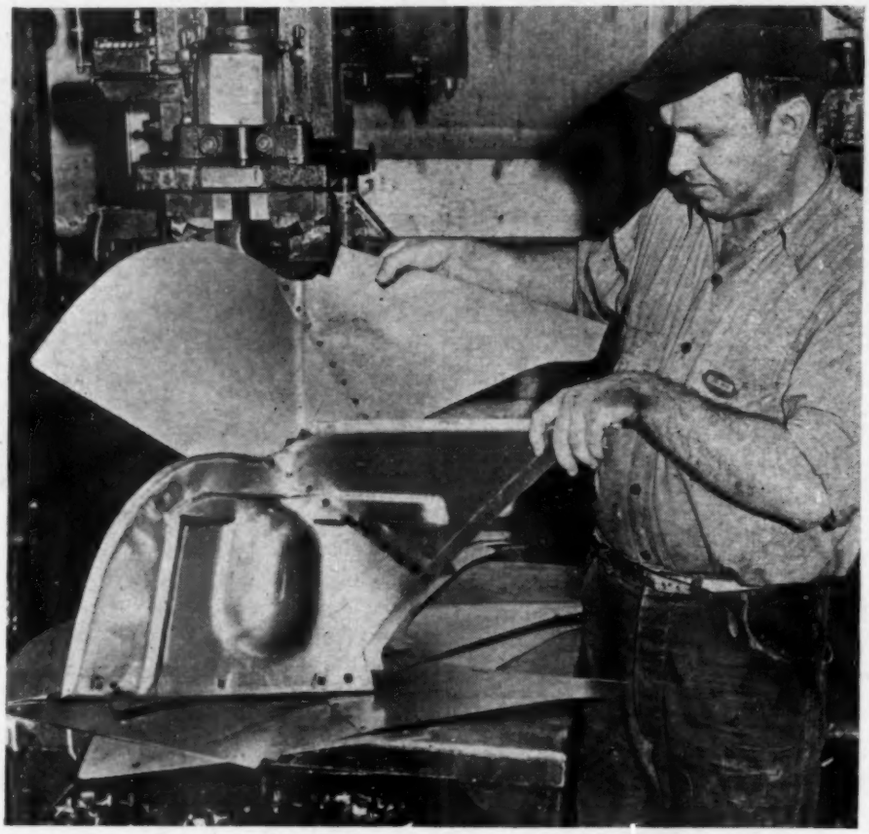
Prime Steel Scrap Salvaged for Other Auto Parts

NEW DIES developed by tool engineers of the Dodge Division, Chrysler Corporation, are accountable in large measure for permitting reuse of prime steel scrap for other body parts. All flat scrap pieces are saved and sorted to be drawn into small parts on the dies, designed to make use of every type of irregular shape.

Segments of flat scrap remain after rolled steel is cut into fender blanks. Scrap pieces that are too small for use by themselves are stitched together in a spotwelder and pressed into such parts as seat end-frames, engine dust pan and fender guards.

After the rear fender has been formed by deep-drawing, four irregular shapes are trimmed from the edges and used to form other body parts. The largest edge piece is rolled flat, trimmed into a new blank, then drawn to form a finished seat back. Smaller pieces are spotwelded together, cut into a new blank, then drawn to form engine dust pans and fender guards. What little scrap remains is baled, conveyed to the adjoining Dodge foundry where it enters cupolas, is remelted and poured into molds for engine blocks and other castings.

Conservation Unit engineers estimate a saving of 300 tons of steel a week by these measures.



Formed by spotwelding two small pieces of flat prime steel scrap together, the composite steel blank (above) is drawn into a fender guard (below) for the new Dodge. This is typical of the salvaging methods being used

COST-OF-LIVING BONUS AIDS EMPLOYEE RELATIONS

BY HAROLD J. ASHE

EMPLOYERS preoccupied with employee grumbling and labor unrest might seriously consider the possibility of inaugurating a cost-of-living bonus for their workers. Even where the possibility of a strike is remote, unorganized slow-downs can be extremely costly, though not immediately visible to management.

One small employer has already instituted a cost-of-living bonus in frank recognition that his employees' fixed salaries are not always in line with fluctuationg costs of consumer goods which employees must buy with their current pay checks.

This employer has worked out a bonus based on the Cost of Living Index, as compiled by the Bureau of Labor Statistics and released by the Federal Reserve Bank. As cost of living goes up, so does bonus.

Not a few employers presently confronted with demands for wage increase are opposing such increases, even while privately admitting the merit of the demands in the light of living costs. Their seemingly paradoxical position is prompted by a fear that, once increases are granted they will remain in effect long after conditions warranting such increases have disappeared and employers' ability to pay has diminished. The cost-of-living bonus composes this fundamental conflict, in that it is in addition to fixed wage and responsive to cost of living.

Here is how the cost-of-living bonus works: The base period selected by this employer has a cost-of-living index of 133.44. The period selected was 4 months prior to the date the plan was put into effect. When the first bonus-month figures were obtained, it was found the index stood at 143.6, an increase of 10.16 points, or 8.4%, over the base period. Thus, an employee receiving $150 a month would receive a bonus of 8.4% of $150, or $12.60.

This employer plans to continue the cost-of-living bonus indefinitely, terminating it only when the cost-of-living index drops down to, or below, that of the base period.

Aside from laying low one of the principal causes for present-day employee dissatisfaction, employers should remember that, with tax considerations in mind, the net cost of such a bonus plan will be materially less than the dollar increase in wages makes it appear to be. Long after the plan is terminated, its beneficial effect may be felt and may be the basis for better understanding between employers and employees when the former feel pinch of diminishing profits.

Practical Ideas

Adjustable Autotransformer and Knee Switches for Small Tools

DON CAMPBELL
Cincinnati

The efficiency of sensitive drills, speed lathes and portable electric tools takes a climb when (1) they are provided with a wide speed range power supply that is quickly adjustable, and (2) a system of knee or foot switches which give the operator better control by leaving both hands free.

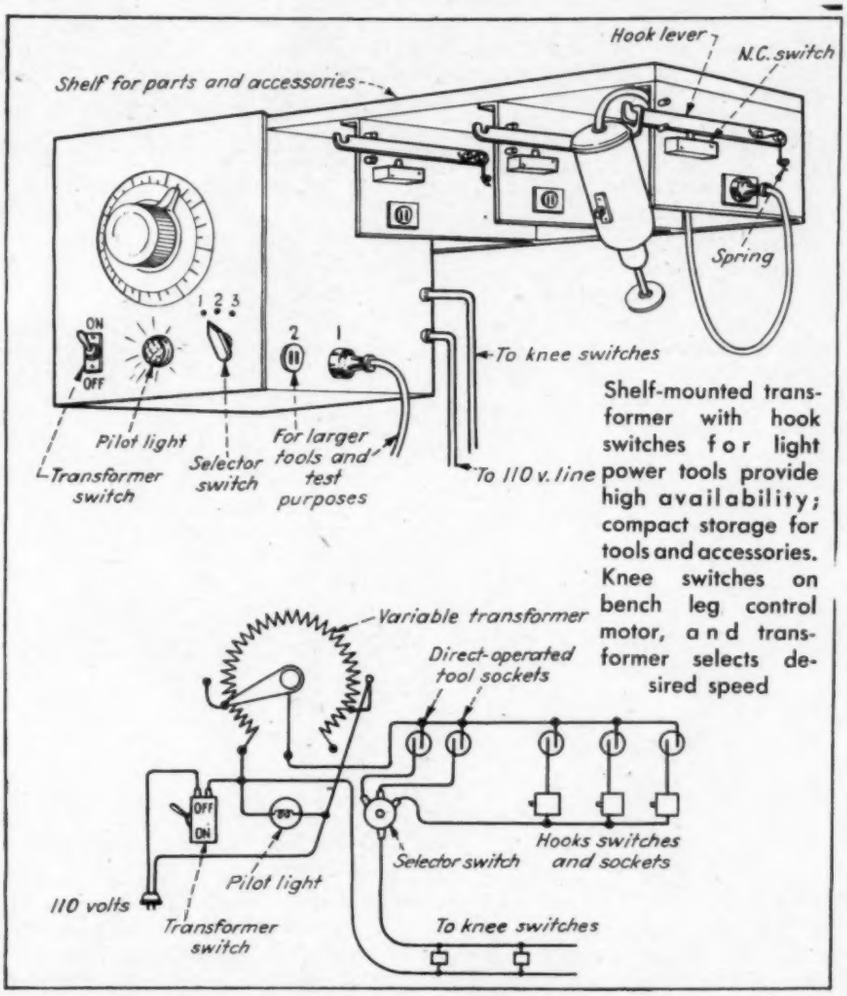
In the average instrument shop or development laboratory where one man is likely to work sitting at a bench and use several small power tools in rapid succession, much time can be saved by operating each with the same knee switch, because the built in tool switches regardless of how well designed, always require an extra motion or two. A frequently-encountered job that illustrates this is drilling a row of small holes in thin metal or wood with a Dumore or Handee tool. The high-speed spindle and tool lightness makes it very suitable for this work, especially when the work is large enough to be awkward on a sensitive drill, but usually both hands are required to hold and position the tool over the punch mark and the motor has to be stopped and started for each hole so the drill won't walk. Now, the motor's hand switch makes things difficult.

There are many solutions, the best in each case depending on the individual requirements. I will describe two possibilities and more will suggest themselves.

Fine work is usually done sitting down, and the only body movement is an occasional shift of the stool. My transformer is mounted on the wall over the bench within easy reach and a row of toggle switches or a rotary (radio type) selector switch on the same panel energizes the desired tool. One of the two knee switches mounted beneath the bench is always within reach so all I have to do is flick the transformer switch, select the circuit for the tool desired, select the speed desired with the transformer knob and pick up the tool. Starting and stopping of any tool is controlled by the same knee switch.

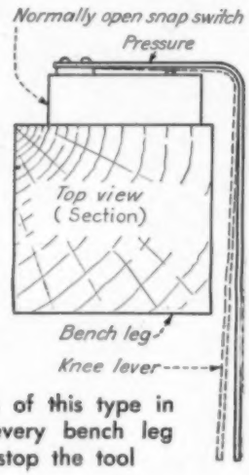
Again depending on the nature of the job, another step might be to hang each portable tool on a telephone receiver type hook so picking it up would automatically close that circuit.

As most tools with a ¼-in. chuck or under draw less than 3 amperes, a 300-watt transformer, costing about $12 should be adequate. The adjustable transformer is better than any rheostat for small series (universal) motors because it adjusts the voltage positively from zero up to 135-v. for a 110-v. line, giving the motor the same type of speedload characteristic at *any* voltage. The



Shelf-mounted transformer with hook switches for light power tools provide high availability; compact storage for tools and accessories. Knee switches on bench leg control motor, and transformer selects desired speed

best rheostat can not *control* a series motor below half speed unless the motor starts under load (hoists, elevators, streetcars, for example) and every motor requires a different rheostat and a rheostat-controlled motor has much less stability at low speeds as a change in load changes the motor current, which in turn changes the voltage drop across the rheostat. Although the transformer's current varies, the voltage doesn't.



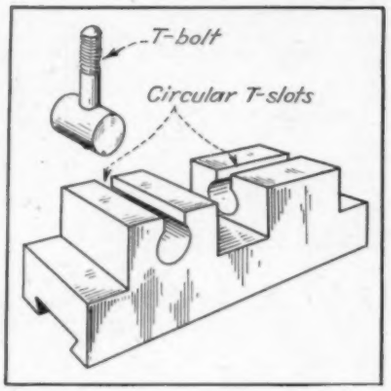
Knee switches of this type in parallel on every bench leg start and stop the tool

Cylindrical Pins Make Good T-Heads

DONALD A. BAKER
Boonton, N. J.

Some time ago we had occasion to make some special lathe cross slides to hold tool blocks both front and rear similar to screw machine cross slides. We did not have a suitable miller and regular T-slot cutters adapted to the job so this design was worked out. The "slots" were prepared in a fraction of the time that planing would take (even if we had a planer), by drilling the widened part and connecting it with a plain slot wide enough to pass the body of the bolt. Heads were made by cutting off short pieces of bar stock, drilling and threading transversely in the center and riveting or pinning the screw in place.

The proportions can be worked out to suit yourself but we learned that with close-fitting heads, there is very little tendency for chips to get jammed in the slots.



Cylindrical slots are easy to make

Flytool Milling Cutter Removes Sand or Scale

A. B. MILLER
Niagara Falls, Ontario

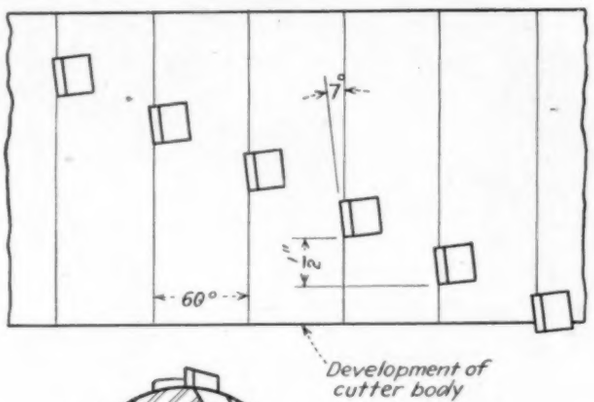
Most iron castings and many types of bronze have a heavy skin of sand which is very hard on end mills of the smaller diameters made of high speed steel.

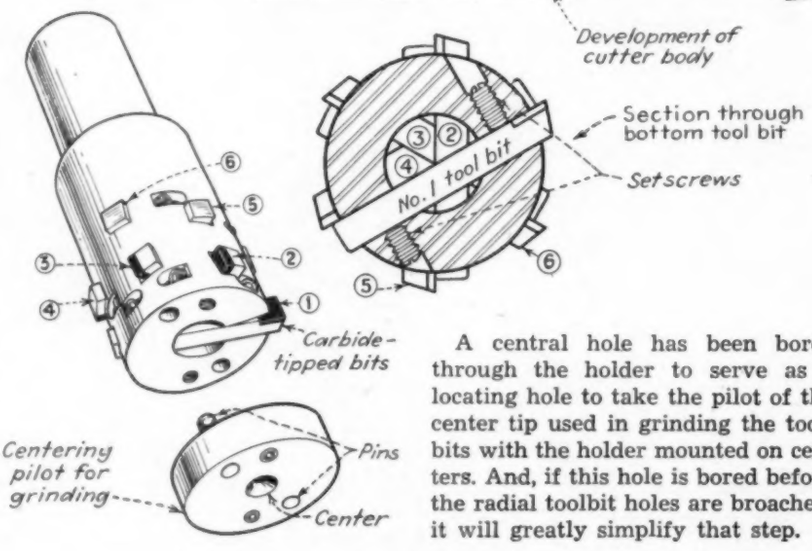
This end mill is designed to do the work of a 2-in. O.D. fluted end mill and will give a good finish with one cut in place of the rough and finish cuts required on most jobs and it also requires only a fraction of the clamping to hold the job while cutting, due to the small amount of cutting edge presented to the work at any one time.

The carbide toolbits used permit increased spindle speeds and cutting feeds which range from three times the feed in cast iron to six times in most bronze as compared with average stock end mills on similar jobs.

The cutter can be made to fit any standard holder for any spindle machine but is particularly suited to holders for straight shanks. The holes for the toolbits are broached through the center of the cutter 5/16 in. from center of one toolbit to the center of next when using ⅜-in. toolbits. The cutting edges are cocked 7° from the axis of the cutter. The end toolbit has a 100° angle from cutter center to allow it to extend from the bottom as well as radially. The 7° angle helps break the shock to the cutting edge and gives a smooth shearing action. If the cutter is to revolve clockwise the toolbit helix is to the left.

Carbide-tipped bits radially and longitudinally staggered in hollow holder clean cored holes to finished size with long life between grinds. Piloted cap provides center for resetting toolbits





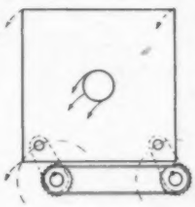
A central hole has been bored through the holder to serve as a locating hole to take the pilot of the center tip used in grinding the toolbits with the holder mounted on centers. And, if this hole is bored before the radial toolbit holes are broached, it will greatly simplify that step.

Circular Guide Races Provide Uniform Lapping Motion

FLOYD W. MILLER
Kenosha, Wis.

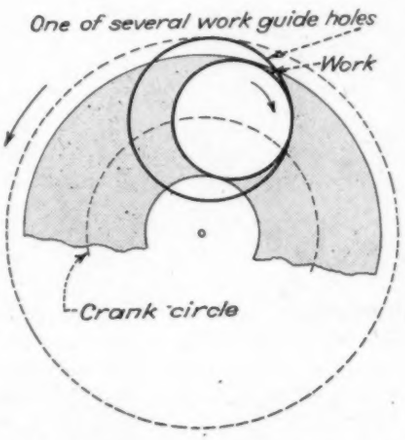
After several experiments with complicated gear setups using stationary ring gears and internally rotating pinions in order to produce a motion suitable for uniform lapping of small disks, I finally turned to a much simpler principle.

If you take a plate and drive it by two identical cranks in phase, every point on the plate will move in a circle of crank radius but the plate as a whole will not rotate. Now, cut a circular hole in the plate and place the work disk to be lapped in this hole. When the plate is set in motion, the hole will move around in a circular path without turning and the disk within the hole, resting on the lapping plate, will be constrained by friction and held against the "rear" edge of the hole.



Rotary motion from two cranks turns every point at same radius

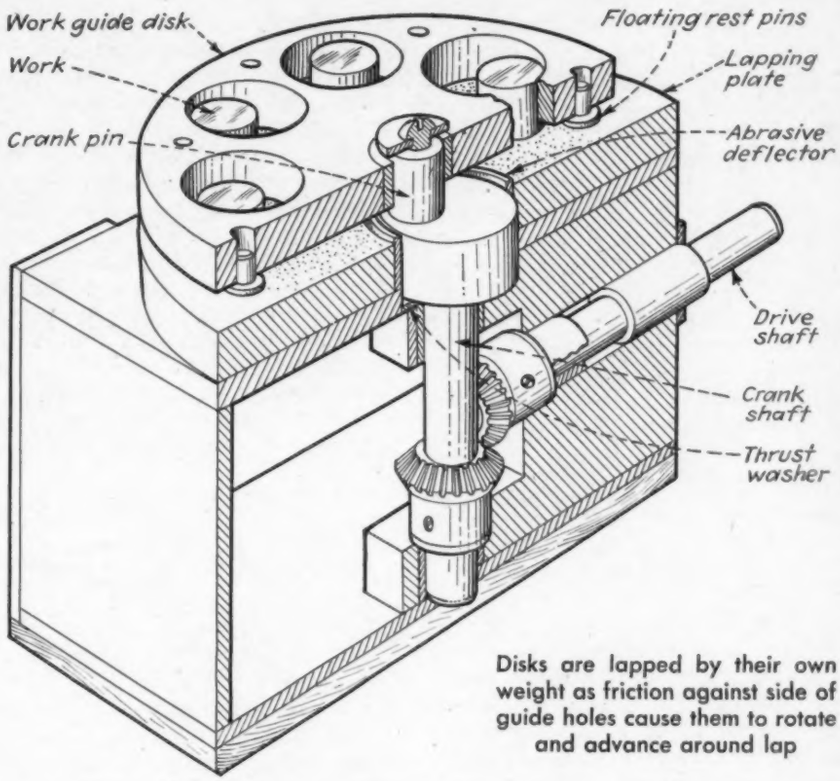
As friction will be evenly distributed over the bottom surface of the disk, its total force will act through the center of the piece, but the nearly opposite force exerted by the edge of the guide hole, also acting toward the center, is at a slightly different angle, tending to push the disk to one side. But the disk is in contact with the guide hole and friction at this point will resist any lateral push, converting it into a rotary motion. Thus, as the "stationary" hole moves around in a circular path, the work disk also moves with it and rotates besides.



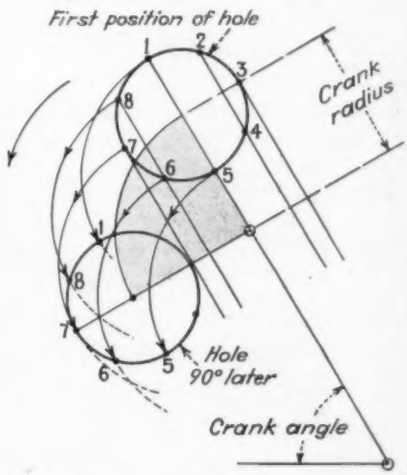
Shaded area is lap coverage per revolution; work revolves opposite to crank rotation

The motion of the disk is identical to that of a pinion rolling along the inside of a stationary ring gear: the pinion rotates about its own center in the opposite direction to the path of the gear about the ring gear center. Of course, there will be slippage depending on so many factors that pre-calculation of the exact relative rpm. would be nearly impossible. You can demonstrate this to yourself in one minute simply by cutting a circular hole in a piece of cardboard and then, holding this in both hands, giving it the same rotary motion as described above. With a coin or other small disk in the hole, the combined rotation will become apparent instantly. This stunt, by the way, is a fairly good method of determining the proper diameters and crank throws, as well as the best speed to run the machine.

There is one drawback in making the machine this way. The disks being lapped cover only a small doughnut-shaped area of the lapping plate, and do not progress around the plate evenly. The solution to this is simple: The work guide is made circular and has the guide holes evenly distributed around the center, and is driven by a single crank pin. The fit is fairly loose, but there is just enough friction at the pin to cause the guide disk to revolve slowly in the direction of crank rotation, thereby causing the lapping surface to change steadily.



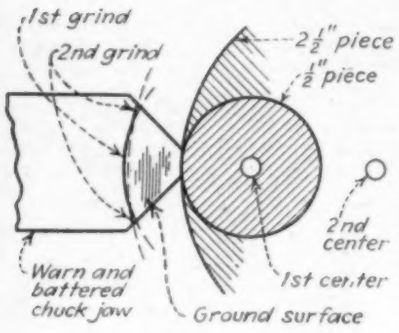
Disks are lapped by their own weight as friction against side of guide holes cause them to rotate and advance around lap



Shaded area shows crank movement; numbers show position of hole

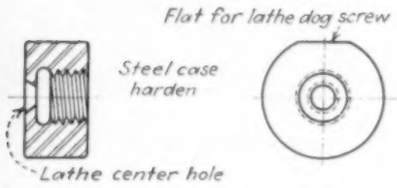
Hints on Small Tools

EARL R. GODDARD



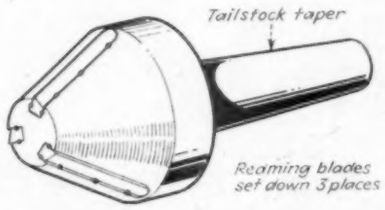
Step Chuck—A badly worn 3-jaw chuck, no longer able to grip short pieces because of rounded jaw corners, can be renovated and given an extra use in this way. Close the jaws on a ½-in. piece, start the lathe and with a toolpost grinder, grind back the jaw faces until a sharp corner is obtained.. The radius of this step should be about ¾ inch. Now, flat pieces or short bushings about 1½ in. in diameter can be chucked in this step and they will be squarely seated to run true as well as concentric.

For larger thin work, repeat the process using a larger piece to set the chuck, say 2½ in., and grind off the remaining sides of the same step at a larger radius. Now work will be gripped on the corners.



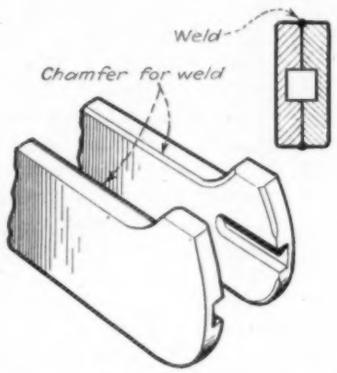
Driver For Threaded Parts—A piece of round steel machined as shown has proved very satisfactory in machining special studs and shoulder bolts where the threaded portion must be driven with lathe dog or chuck jaws. The part to be machined should screw in and against the shoulder easily for quick removal. If many parts are to be made using the lathe dog as a driver, it may pay to make two nuts. Using two dogs, one nut with one dog left attached may be removed and put on the next piece while one is being machined.

Countersink — This three-bladed reamer was designed for reaming a narrow countersink in the ends of rough, cast-iron bushing stock, pipe and tubing. If one tries to turn the outside of the above when a cored hole is rough and out of round the outside wall also be out of round. Some bushing stock is 14 in. long so it is out of the question to try to true up one end with a tool when perhaps one may have only a 1¼-in. grip with chuck jaws. When using the reamer, a ½-in. bite with a 3-jaw chuck will hold the bushing while the reamer enters the core and keeps the bushing in line until

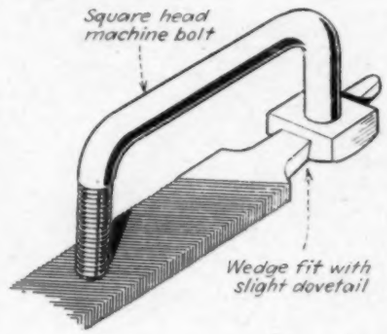


a narrow countersink is obtained.

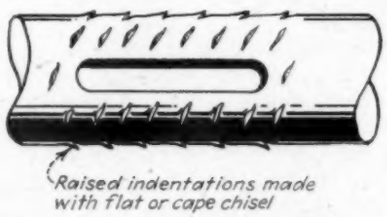
The blade should be a snug fit. The three blades are pressed into the slots and with a small stiff punch, the back edge is set over in three places. This will hold the blades and should it be necessary for any reason to remove a blade, less trouble will be encountered than if the blade was fastened its entire length.



Welded Toolholder—For tungsten carbide toolbits a standard size toolholder was welded together from two symmetrical halves. The pieces are fiinsh-machined after the tool slots have been cut and the halves are clamped together with a bit and shims in place to be certain of correct alignment. It is then chamfered all around for the weld, and the unit is tacked-welded to hold the position. After welding, the tool is ground smooth and casehardened.



File Handle—For filing a wide surface this handle has proved a very good addition to a tool box. The bolt is bent as shown and a tapered slot cut out to fit the tang of the file being used. When driven on tight it stays put.



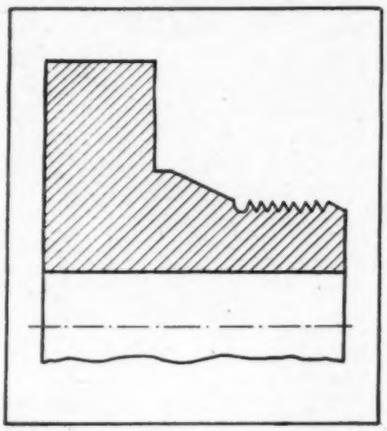
Loose Pulley Repair—Where knurling is impossible or impractical, a pulley or other part that is loose on a shaft may be tightened satisfactorily by the method shown and done very quickly. A cut started with a chisel will raise a small portion of shaft, increasing its diameter. Indentations may be made in the form of an X if desired, but in any case, cuts should be made on an angle to facilitate assembly.

Bumping Pad—A piece of old pipe filled with babbitt and placed on the floor or some solid foundation makes an excellent pad on which to "bump off" pump runners from a shaft or any similar job where it is necessary to protect shafts, etc. from damage.

How To Remove A Heavy Lathe Chuck

ARTHUR E. LYNCH
Oregon, Wisconsin

On many older type lathes with threaded spindle noses, the longer the chuck remains on the spindle nose, the tighter it becomes. This is particularly true when the cut is intermittent and also if the chuck mounting combines a locating taper as well as the threaded mounting. On a heavy duty lathe with a 20 to



Standard nose adapter can be bolted to old spindle, preventing jams

50 hp. motor, a chuck mounted on a nose of this type is almost impossible to remove. Heat applied to the chuck body and dry ice in the spindle bar may be of no avail, even though great pressure is applied in the form of pounding with sledges on suitable bars fastened to the chuck. However this type of chuck can be removed very easily in the following manner:

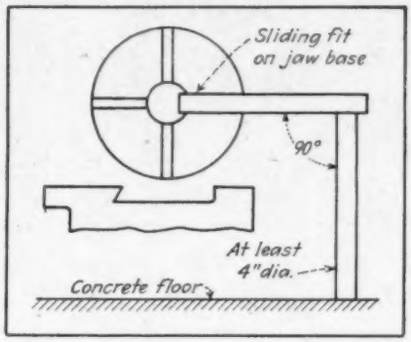
1. Remove jaw bases from chuck and insert a square bar machined to fit jaw base slot and extending over machine ways in a horizontal position far enough to contact another heavy bar resting on the floor at the rear of the machine.

2. Tighten up the low speed driving clutch as tightly as possible and still be able to pull the clutch lever in.

3. Put machine headstock on its lowest speed.

4. With one bar on the pulley spots and another to hold the "bite," bar the drive pulley around until enough force is applied to break the chuck loose from its seat.

5. After tension is applied in this manner for a few moments, a slight



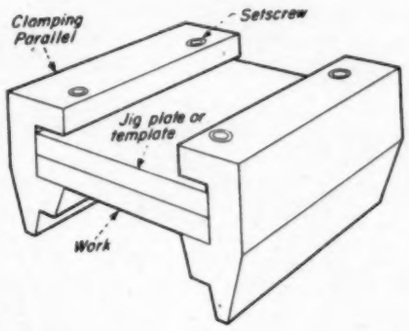
Heavy supports are necessary in removing "frozen" chucks

tap on the chuck body itself is usually enough to break the chuck loose.

This sounds simple but it is a very effective means of removing chucks as it does not damage the machine, threads or chuck.

When replacing the chuck a coating of white lead and oil should be applied to the threads, or better yet an American type adapter can be made and the old nose machined and the adapter bolted securely to the spindle. With this done no further trouble would be had and the shop would have the added advantage of having a standard, up-to-date spindle nose.

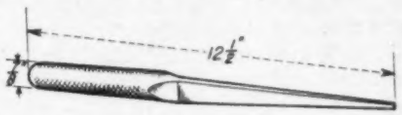
More Tool "Shorts"



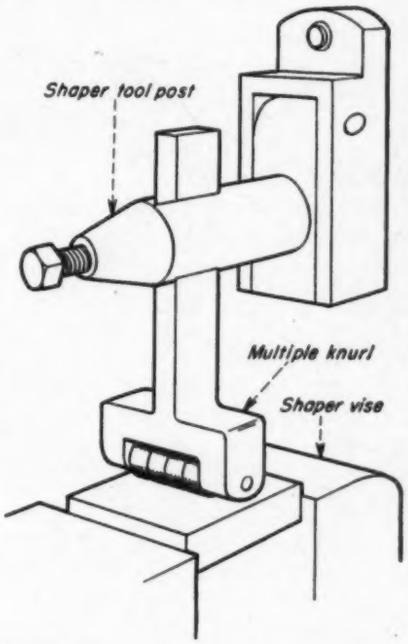
Clamping Parallels—By using these instead of the customary C clamps and parallels several advantages have been noted. The danger of work slipping off the supports and breaking a drill or injuring the operator and the possibility of drilling into the parallel is eliminated. Stubbing down the drills to a shorter length is possible, thereby increasing the accuracy of jigged holes.

Several different sizes can be made to suit a greater variety of work. *Richard M. Buller.*

Drillpress Drift—Forged from SAE 6145 chrome vanadium steel and heat treated to a Rockwell hardness of 48 to 50 C, this drift has proved to be a practical, timesaving tool. Its lever action enables the user to remove morse taper sleeves Nos. 1 to 4 from a drillpress spindle without



the use of a hammer. The operator can hold the drill or chuck in one hand while ejecting it with the other. This eliminates the possible damage to the drillpress spindle and bearings when using a conventional drift and hammer. Keeping the drift in a bracket mounted on the drillpress within easy reach, results in considerable saving of time often wasted looking for a hammer and drift. *John Beyen, Sidney, N. Y.*



Flat Knurling—Instead of machining serrations in flat work—a vise jaw, for instance—I've found it much faster to use a knurling tool in the shaper toolpost and the results are better by far.

The tool I made carries four knurls on a ¼-in. shaft in a 1¼ x 2½ x 6¾-in. holder, although a single tenure will do the job. This process exerts heavy pressure so be sure of your fastenings. *Roger Isetts, Kenosha, Wisconsin.*

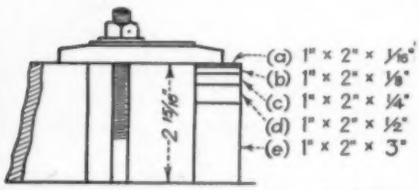
Graded Block Sets Aid Clamping Buildups

S. FRAMURZ
Bombay, India

Most machinists have an odd assortment of packing blocks and shims which they combine as best they can by cut and try methods to build up a required height while clamping a job. Not infrequently, the available blocks fail to size up for the work on hand, resulting in much loss of time (and temper) rummaging for others. Blocks correctly graded for size provide a very simple, yet adequate solution.

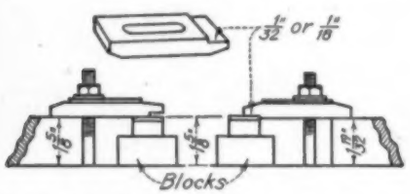
For instance, it is possible to build up every height, from 1/16 in. to 4 in., in 1/16 in. steps with just 5 blocks graded as follows:

(a) 1 in. x 2 in. x 1/16 in.
(b) 1 in. x 2 in. x ⅛ in.
(c) 1 in. x 2 in. x ¼ in.
(d) 1 in. x 2 in. x ½ in.
(e) 1 in. x 2 in. x 3 in.

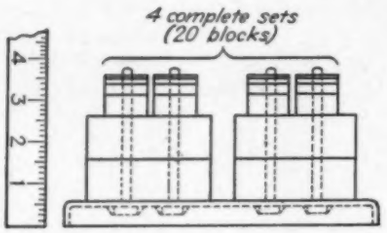


Five block sizes permit building up to 4 in. in 1/16-in. increments

The last block actually serves the purpose of three blocks so that, between them, the 5 blocks provide 63 different combinations. For increased range, one more block of type (e) may be added. Then any height up to 7 in. is possible in steps of 1/16 in. giving in all 111 combinations. If variation in height is desired by finer than 1/16 in. steps, this can be done, without increasing the number of blocks, by simply machining a 1/32 in. step in the clamp. This would double the number of combinations e. g. using a given block dimension, say 1⅝ in., it is possible to clamp a workpiece of height 1⅝



Stepping the clamp by 1/32 in. doubles the possible combinations



For combined efficient storage and availability, drill blocks and stack

in., or 1-19/32 in. or 1-21/32 in.; in the last case the step is placed on the workpiece. The basic size of 1 in. x 2 in. has been found convenient for most general work. The blocks may, with advantage, be made of low carbon steel and case hardened. A hole in the body makes for convenient storage.

Simple to make and use, providing firm support, complete within their range and permanently durable, graded blocks have much to recommend them even against adjustable screw blocks (which are not without limitations). Not the least of the advantages of graded blocks is that, being so few in number, any required height is built up instantly, without trials or guesswork.

Alternately, a 1/16 in. step may be machined in the clamp and the 1 x 2 x 1/16-in. block dispensed with, thus reducing the number of graded blocks to four.

Four complete block sets can be stored on one compact base using pins to position the drilled blocks

Faceplate Mounted Unit Grinds Inside Castings

U. WHEATLEY
New South Wales

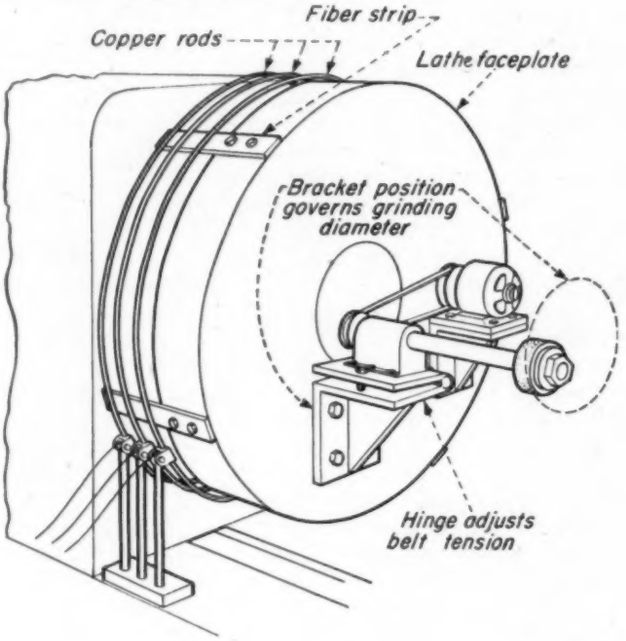
We had to grind the pin holes in some manganese dredge buckets, and although a machine for this job was on order, we had to get started on a temporary basis right away. In what time we had available a rig was prepared as shown in the accompanying sketch. Use was made of an old lathe with a 5-ft. faceplate giving a chance to bolt the buckets down on the saddle with pin holes in line with lathe centers.

Two angle brackets bolted to the faceplate carried a small ballbearing housing for the grinding spindle and wheel and a small electric motor connected together with a Vee belt.

Three hoops of copper rod were held and insulated from the face plate by fiber supports bolted to the plate. At a convenient location, shoes of ths usual crane runner type, were set to rub on the copper coils—one shoe to each coil, naturally.

Lead-in wires were carried from the coils to the motor, all safely insulated from the metal of the machine.

The grinding spindle was arranged to pivot on a hinge at one side and at the other, setscrews were used for adjustment while others acted against these, firmly locking the wheel in desired relation to lathe centers.



An emergency repair was effected using a toolpost grinder mounted off center on a large faceplate

Use The Bandsaw And Save Material

H. J. CHAMBERLAND
Springfield, Mass.

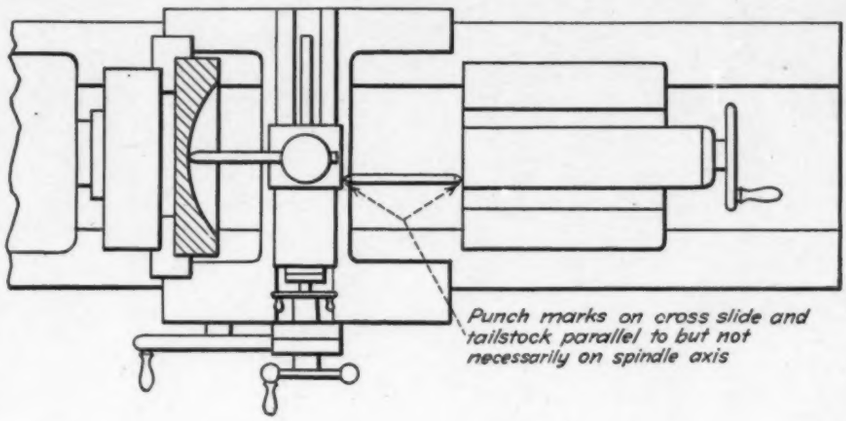
Many jobs, normally done in a lathe or drillpress, can be done better with a bandsaw, especially when a lot of stock has to be removed. A skilled operator can saw close enough to size to require only light finishing operations, and even a less skilled man can do the job faster than by conventional means.

As an example, we had to make four bushings 4 in. long by 5 in. O.D. and 4 in. I.D. of manganese steel. Boring these to size would have reduced about 60 lb. of metal to chips. Sawing produced a 14-lb. slug, which, after turning to a smooth 3½-in. diameter, weighed 10 lb., a total of 40 lb. or 66% of the material saved.

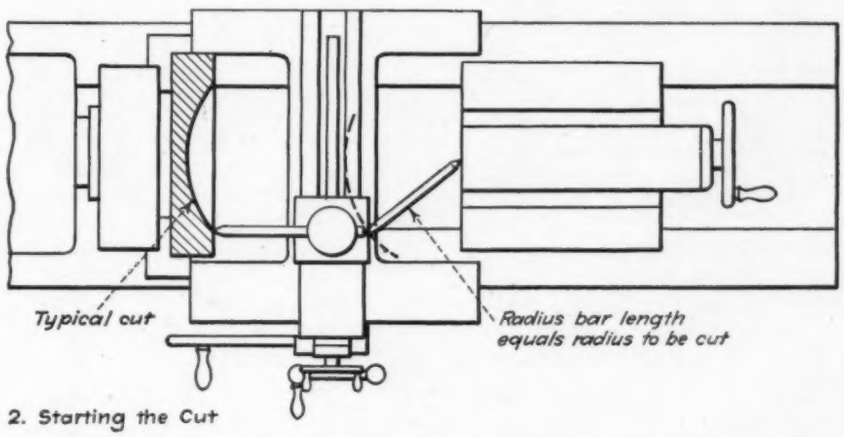
The layout line provides for a 1/64-in. allowance for grinding the bores after hardening. All four bushings were completed in 6 hr., including the time for drilling a ¼-in. saw-starting hole. The radius involved required a 3/16-in., 14-pitch, 0.042-in. raker-set saw operating at a velocity of 100 fpm. Any experienced operator has no trouble following the outline closely, bearing in mind the width of the saw kerf in relation to the stock allowance as previously mentioned. The less experienced operator should definitely increase the radius of outline by 1/16 in., and trust to a light cut in the lathe to play safe.

Any rigid bandsaw designed for metal cutting can execute contour sawing; the important factor is the type of blade and the correct velocity. Any high-quality hardened-tooth blade can do straight cutting, but efficient contouring is governed by correct depth of tooth hardness. If this hardness extends to but not beyond the gullet line, the saw will respond to the strains of contour sawing because the teeth have the necessary spring.

On the 4-in. thickness of these bushings, the cutting rate exceeded ⅛ lineal inch per minute with a perpendicular accuracy within 0.003 in. Such precision is possible only with a saw intended for this kind of work. Something else to bear in mind is that contour sawing often costs less than other machining methods even when there is no real saving in time.



1. Setting the Radius Bar



2. Starting the Cut

To cut a spherical indent of about 60° central angle and moderately large radius, mount a double-pointed pin of that radius between cross slide and tailstock

Connecting Rod Controls Large Radii Turning

DALTON WHITE
Atlanta, Ga.

An easy method for machining a large concave radius on an engine lathe has been devised by John Caldwell, chief engineer for the Henderson Foundry & Machine Co., division of Southern States Equipment Corporation, of Hampton, Ga.

Considerable difficulty had been experienced in machining large castings and the numerous irregularities had to be hand tooled to gain trueness and smoothness. Formerly, work was hand fed and fitted with a templet, but this method would leave irregularities which had to be hand smoothed. Finishing a 12-inch radius shallow disk was a 5- to 6-hr. job.

By the new method a pin is first cut equal in length to the desired radius to be machined. With the cutting tool at the center of the lathe, punch marks are made on the cross slide and the tailstock such that when the pin is placed between the punch marks it is parallel with the centerline. The pin is then removed and the tool moved out to the starting point, and set for the desired cut at the outer edge of the radius. The pin is replaced in the center punch marks, the tailstock is clamped and the cross feed is engaged.

When the tool reaches the centerline, the feed is disengaged and the tailstock is loosened so the pin can be removed before retracting the tool.

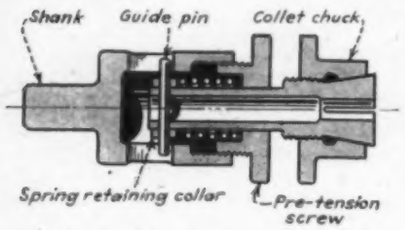
This method will machine a perfect radius without irregularities in about 30 minutes.

Tension Chuck Improves Coil Winder Rigidity

JOHN J. KOSTER
Jersey City, N. J.

The one-piece split jaw of this collet chuck is a snug sliding fit in the shank cup and sleeve nut. Between the jaw collar and the flange on the sleeve is placed a strong compression spring which tends to keep the chuck all the way in against the bottom of the cup. A drill rod pin holds the jaw collar in place, and extending out both sides, engages in slots in the cup to keep the jaws rotating with the shank.

Long slender mandrels in the coil winder bend under the strong side pull exerted by the wire feeding mechanism which restrains the wire as it is pulled on to the rotating mandrel. This has been overcome in large measure by using this tension chuck in the tailstock to automatically maintain a strong longitudinal tension.

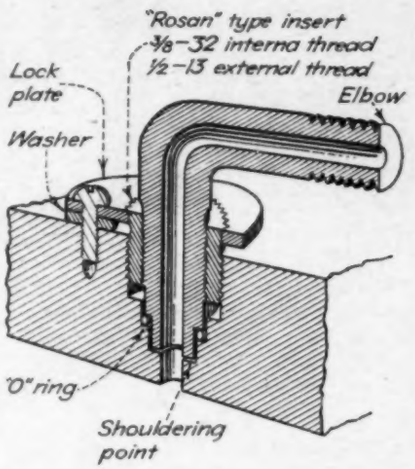


Slender coil winding mandrels tend to deflect less when placed under tension with this spring-loaded chuck

Rosan Insert Permits 360°—Elbow Positioning

LESTER WOLFSON
Los Angeles

When it is necessary to seat tube fittings at a certain angular position and make them tight at the same time, one solution is to bush the hole with a Rosan insert having a very fine outside thread compared to the thread on the fitting. This pitch differential allows axial movement with no radial movement, because, holding the fitting stationary and turning the insert counter clockwise will advance the fitting much faster than the insert is backed out. The usual locking device holds the Rosan and the tube fitting is permanently set with any desired pressure.



Differential-pitch bushing allows axial travel for tightening without disturbing a critical angular adjustment

This differential-pitch principle can be applied to small turnbuckles, jacks and clamps, too, with two advantages over the conventional left and right screws, or a single screw using some sort of swivel: They can be made with ordinary taps and dies, without costly left hand tools, and fittings can be much more compact.

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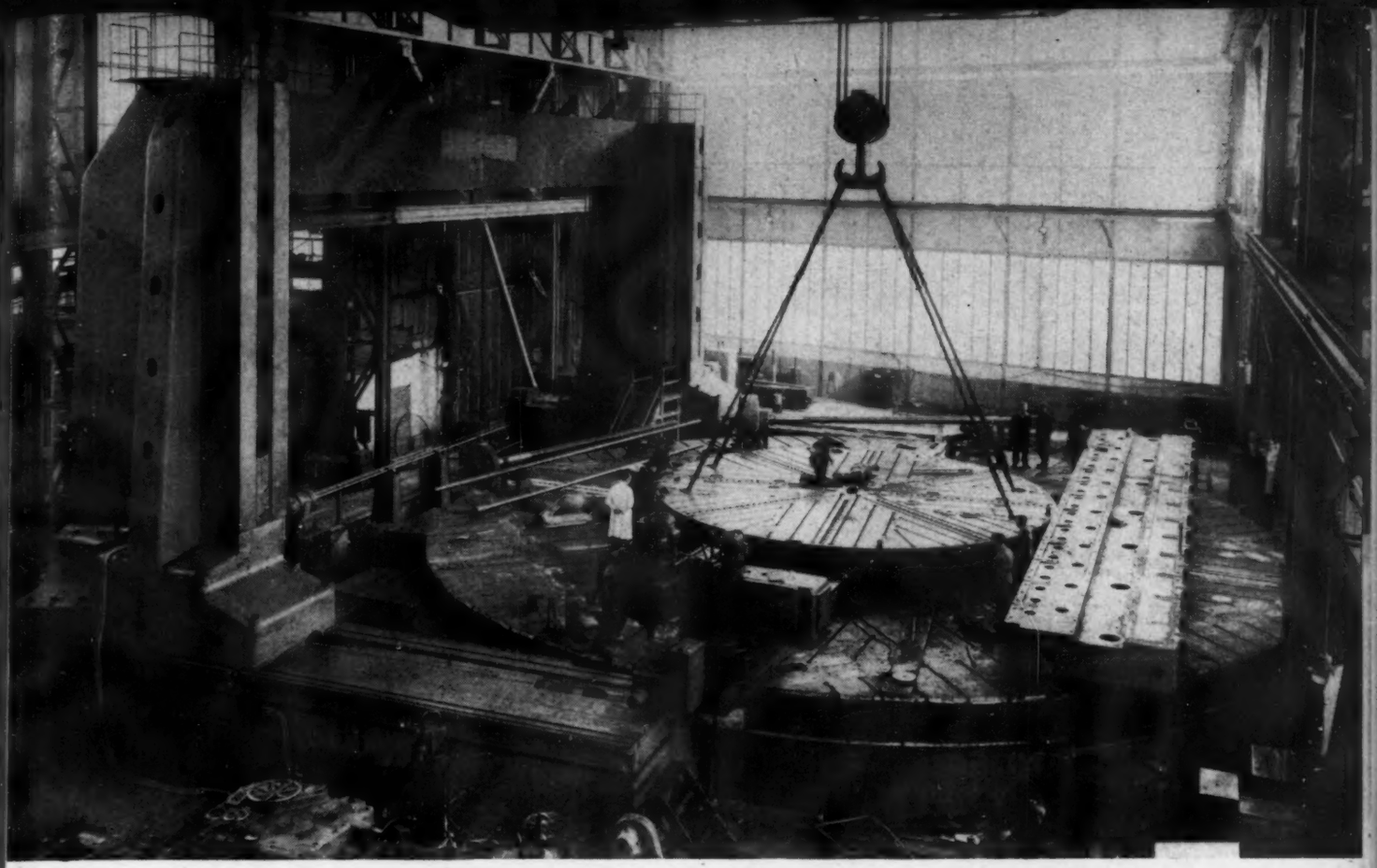
Twenty-third Selection—S. Framurz' Straightedge Tester



SYMBOLIC OF GERMAN PLANT DISMANTLEMENT—This giant double-column vertical boring mill reflects Germany's once-proud mechanical might. It is shown in the process of being dismantled as a "spoils of war." The equipment was removed from the Schiess Defries plant at Dusseldorf. Because of their power as a war potential, machine tools in Germany represent a heavy battery of reparations material

German Machine Tools—Spoils of War

BY JOHN C. CHRISTIE, BERLIN BUREAU, McGRAW-HILL WORLD NEWS

This exclusive survey of plant dismantling operations in Germany points up problems in connection with removing machine tools as reparations. Dismantling activities and production operations in the four occupied zones are described. This report emphasizes important policies involving German machine tools and production which must be met by the Big Four at the forthcoming Moscow Conference

GERMANY'S once formidable machine tool industry, condemned to 11.4% of 1938 capacity under the controversial 1949 level of industry plan which grew out of the Potsdam Agreement, now faces the prospect of being permitted a better status.

The forthcoming Moscow Conference points to an upward revision of the 1949 levels—not because the Big Four feel compassionate toward Germany but because a number of political and economic realities not foreseen at Potsdam now require different methods for final settlement of the German level of industry and related problems of reparations and control of war potential. The 1949 level of output for German industries was adopted by the Allied Control Council to supplement the Potsdam Agreement.

Effect of advance reparations on the German machine tool industry and its present status are questions of timely importance. The answers, however, vary between eastern and western Germany because of zonal divisions of the nation's economy and absence of a uniform economic policy. They can be summed up:

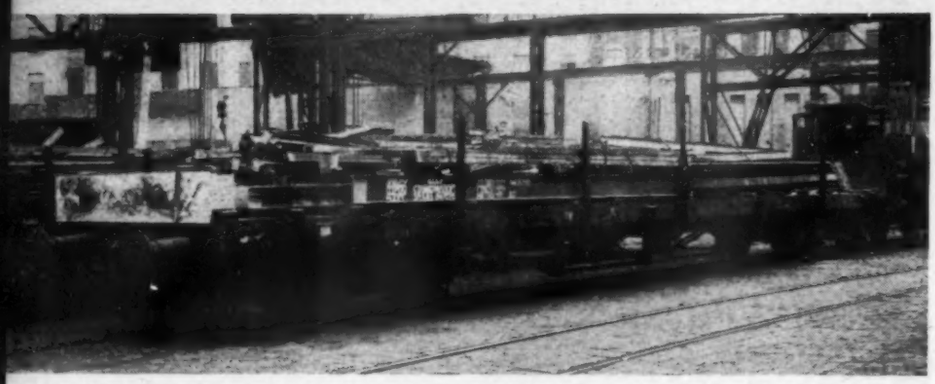
1. Machine tool capacity in western zones have been affected relatively little by advance reparations, whereas in the east the Russians have made wholesale removal of production facilities.

2. Productionwise, the industry has been at a virtual standstill in the western zone, while in the east the Russians are reported to have overburdened remaining facilities with reparation orders. Manufacture of machine tools in western Germany, particularly in the industrially important British zone, has been limited to minimum requirements of extremely low-level industrial activity.

Status of Productive Capacity

SOVIET ZONE: The Russians thus far have not made public a complete official accounting of reparations taken from Soviet-occupied territory. Reliable German sources estimate only about 18% of the 1936 machine tool producing capacity of Berlin and the Soviet zone remains.

All sectors of Berlin are included



PRODUCTION IS ONLY A MEMORY—Total dismantlement leaves only the site of Schiess Defries plant as a reality. Among the largest of Germany's former machine tool factories, even the physical structure has been taken down as part of Germany's payment for war. Structural steel is shown loaded on freight cars (below) for shipment to Allied nations as reparations

in figures given for the Soviet zone because the Russians were responsible for dismantling in sections of the city now occupied by the other three powers. Of the 82% lost capacity, 67% is charged to dismantling and 15% to war damage. Both percentages apply only to equipment, not buildings.

German surveys place particular emphasis on the fact dismantling has wiped out certain lines of machine tool production in which eastern Germany specialized. Loss of facilities for producing milling machines and gear-cutting machines is cited as likely to cause the most serious dislocation in the industry.

As sole occupants of Berlin from the time hostilities ended in May '45 until other Allied forces arrived in July, the Russians did a thorough job of stripping factories. These operations were more in the nature of ransacking than dismantling. Much equipment was ruined by hasty and careless removal.

Virtually all of the 50 machine tool factories in the Berlin area were stripped. The ten leading firms had between 25,000 and 30,000 machines and were left with 60 to 80 among them. Most of these firms have resumed limited operations by repairing machines passed over as unserviceable, salvaging others from ruins or otherwise acquiring them.

Western Zones

BRITISH ZONE: Three machine tool plants in the British zone have been dismantled as advance reparations. One is Schiess Defries of Dusseldorf, largest machine tool producer to be given up in the western zone. Comprising five plants, the enterprise has been allocated as follows: Lorick and Kolnerstrasse plants, with total value of 12,765,189 Reichmarks, to Russia; Reisholz, valued at 2,772,000 RM, to Yugoslavia; Oberkassel, valued at 245,880 RM, to France; and Heerdt, valued at 270,-864 RM, to Albania.

Principal products of Schiess Defries were crankshaft-turning equipment, tool and cutter grinders, horizontal borers, gear cutters, gunboring equipment, universal milling machines, plane milling machines, heavy lathes, slotting machines, equipment for railway shops and special machine tools of largest size.

India is recipient of Wagner and Co. of Dortmund, valued at 1,853,900 RM. Out of H. A. Waldrich at Siegen, Czechoslovakia received machinery valued at 2,268,220 RM, and the United Kingdom obtained equipment valued at 140,768 RM.

U. S. ZONE: Only three machine tool producing plants have been dismantled as advance reparations. A fourth plant, Hahn and Kolb of Stuttgart, originally was to be taken as advance reparations (AMERICAN MACHINIST report on German industry, Feb. 14, '46) but was deleted from the list.

Czechoslovakia is receiving 60% and the United Kingdom already has received the other 40% of Fritz Mueller Pressenfabrik at Esslingen, valued at 2,103,979 RM. Hahn and Tessky Indexwerke of Esslingen, well-known producer of automatic screw machines, has been allocated 97% to the United Kingdom, and 3% to India. The plant's value is listed as 1,487,318 RM. The third plant is Bohner and Koehle of Esslingen, which has been delivered to Belgium and is valued at 246,303 RM.

FRENCH ZONE: None of the 41 machine tool plants in the French zone have been allocated for reparations as yet. With at least economic integration of the Saar area with France almost certain to be approved, dismantling of the comparatively small amount of machine tool producing capacity under French control is not likely to materialize.

Machine Tool Holdings

SOVIET ZONE: The Russians have not gone along with the other three powers on an agreement to prepare inventories of machine tool holdings. On the basis of German reports showing drastic curtailment of productive capacity in the metalworking and machinery construction industries, it can be assumed holdings in the Soviet zone have been reduced considerably.

WESTERN ZONES: Inventories made by the three western powers have been challenged in the belief holdings in many wartime dispersal plants and other small shops have been overlooked. Scattered capital equipment stemming from uncontrolled confiscation in early days of occupation has made strict accounting difficult. Inventories have confirmed earlier conclusions that war damage did not reduce excessive holdings to within the limits of normal requirements.

Since the western zones have pursued a cautious reparations policy, relatively few machine tool holdings have been drained off by dismantling as yet. The U. S. held that the low level of industry growing out of the Potsdam Agreement would be wholly impractical unless integrated. Up to May, only 24 plants had been allocated as advance reparations and many of these made war items. An additional 97 war plants, including 24 put up in January, marks total reparations in the U. S. zone.

The British have proceeded much along the same lines as the U. S. The French limited reparations almost

entirely to war plants. Consequently, machine tool holdings available for reparations have had to come largely from war plants. Following is a brief survey of what has been done in each of the three western zones:

U. S. ZONE: More than 7,000 individual machine tools are being made available to either Russia or the Inter-Allied Reparations Agency for distribution to western nations out of plants dismantled in the U. S. zone.

Airplane factories have been the most lucrative sources. The Bayerische Motorenwerke A.G. of Munich, which made aircraft engines and aluminum castings, has netted about 1,500 machine tools. One plant, valued at 16,104,238 RM, had 700 general-purpose machine tools, and the second, valued at 11,050,498 RM, contained about 725, including 299 lathes, 155 drilling machines, and 119 milling machines.

Out of the huge Kugelfischer ball-bearing plant at Schweinfurt, 2,657 or 69.6% of the plant's machines were in usable condition. Although several hundred machine tools were made available by dismantling the plant, most of the machines were special types peculiar to the industry and many were developed by the company. The equipment was divided between Russia and the western nations group under IARA.

A total of 350 machine tools were made available to western nations out of the Kloekner-Humboldt-Deutz A.G. diesel engine plant at Oberusel. Dismantling of the Hensoldt optical instruments plant at Herborn will make 240 machine tools available, of which the Netherlands will receive 88%, France 3%, and the U. S. 9% (the latter for technical investigation).

From four Henschel aircraft engine factories in Greater Hesse, Russia will get 1,304 machine tools and from two other Henschel factories, western nations will receive a total of 466. One Junkers plant near Kassel has provided for allocation among western nations a total of 800 machine tools, including 137 lathes, 80 automatic turret lathes and 162 grinding machines.

CRATING MACHINE TOOLS—German workers are shown dismantling a lathe in preparation for packing and crating it as reparations equipment. They are shown in the Kugelfischer Ball-Bearing Plant, half of which was sent to Russia. The remaining half of the plant is earmarked for western nations but is still operating pending final decision on permitting ball-bearing production. This half produced 6,200 tons of bearings in 1946

BRITISH ZONE: A total of 87 plants of all types had been confirmed for reparations in the British zone up to Feb. 1. A rough estimate, based on incomplete inventory returns for these plants, indicates upward of 5,000 to 6,000 general-purpose machine tools will be made available for reparations.

The British have devised a scheme whereby nations entitled to reparations can obtain individual items of equipment urgently needed for their industrial reconstruction. Western nations must make requests for individual items through IARA in Brussels. The initial program provides for such deliveries up to a total value of 75 million RM. Machines may be taken from plants not allocated for reparations, but not from productive capacity already earmarked for retention in Germany. The matter of taking whole plants as reparations will depend on Big Four action.

FRENCH ZONE: Only 28 plants in this zone have been allocated for reparations and consequently no significant amount of machine tools have been made available from this source. The French, however, have a scheme under which nations entitled to reparations can obtain individual items of equipment from their zone. It operates on the same principle as the British program but provides for deliveries up to a total value of only 15 million RM.

1946 Machine Tool Production

Quarterly production figures for each zone for 1946 are given in the table. They are from official reports prepared for the forthcoming Moscow Conference, by each of the four control authorities.

That machine tool production in the western zones has been running at a low percentage of even the 1949 levels is not surprising. It reflects the acute shortage of coal and steel.

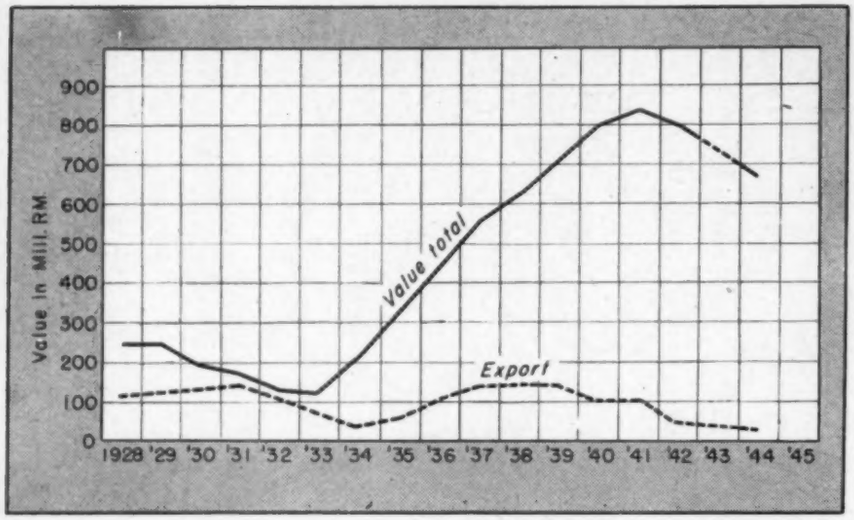
While the British zone has the highest permitted capacity, it had by far the lowest production rate in 1946. British authorities say that until reparations drastically reduce machine tool holdings, production will be held down. Thus machine tool manufacturers have low priority

DISMANTLED MACHINE TOOL PLANTS IN BERLIN AND THE SOVIET ZONE

BERLIN—Loewe A.G.; Fritz Werner A.G.; Herbert Lindner; Raboma Machinenfabrik, Herbert Schoening; F. A. Scheu; R. Stock and Co. A.G.; Karl Jung Machinenfabrik; Deutsche Niles Werke A.G.; AWG (Allgemeine Werkzeugmach nen-Aktiengesellschaft).
CHEMNITZ—J. E. Reinecker A.G.; Herman Pfauter; Wanderer Werke A.G.; (Siegmar and Schonau plants); Werkzeugmaschinenfabrik "Union"; U. Pomitz and Co.; Marathon Werke A.G. (formerly Sondermann and Stier A.G.).
COSWIG-DRESDEN—Dolze and Slotta G.m.b.H.
DOBELN—Liebert and Gurtler.
DRESDEN—Hille-Werke A.G., and H. Grossman.
ERLAU—Diezmann and Schonherr.
FREITAL—Fischer and Co., G.m.b.H.
LEIPZIG—Pittler A.G.
GERA—Elze and Hess; Karl Wetzel; Wesselmann Bohrer Co., A.G.
GLAUCHAU—Wotan and Zimmermann Werke, A.G.
ZERBST—Franz Braun A.G.
ZEULENRODA—Carl Kneusel, and Adolf Lang.

SALES OF COMPLETE TOOLS

(For years 1928 to 1944)



Curves refer to the territorial limits of Germany as of 1937. The 1928 and 1933 data is from the Stat. Reichsamt. No figures are available for 1943.

1946 MACHINE TOOL PRODUCTION BY ZONES

U. S. ZONE:

Yearly permitted output under 1949 level of industry..... 25 million RM
Quarterly " " " " " " " .....6.25 " "

Production for:

1st quarter.....	748,800 RM	or	12%	of	permitted	quarterly	level
2nd "	750,000 RM	"	12%	"	"	"	"
3rd "	936,000 RM	"	15%	"	"	"	"
4th "	625,000 RM	"	10%	"	"	"	"
Total 1946.....3,059,800 RM		"	12%	"	"	yearly	"

BRITISH ZONE:

Yearly permitted output under 1949 level of industry.....27.3 million RM
Quarterly " " " " " " ". ..... 6.8 " "

Production for:

1st quarter.....	330,000 RM	or	5%	of	permitted	quarterly	level
2nd "	420,000 RM	"	6%	"	"	"	"
3rd "	510,000 RM	"	7%	"	"	"	"
4th "	540,000 RM	"	8%	"	"	"	"
Total 1946.....1,800,000 RM		"	7%	"	"	yearly	"

SOVIET ZONE:

Yearly permitted output under 1949 level of industry..... 17 million RM
Quarterly " " " " " " .....4.25 " "

Production for:

1st quarter.....5,600,000 RM		or	131%	of	permitted	quarterly	level
2nd " .....6,500,000 RM		"	153%	"	"	"	"
3rd " .....6,000,000 RM		"	141%	"	"	"	"
4th " .....6,100,000 RM		"	143%	"	"	"	"
Total 1946.....24,200,000 RM		"	142%	"	"	yearly	"

FRENCH ZONE:

Yearly permitted output under 1949 level of industry..... 4.6 million RM
Quarterly " " " " " " " .....1.15 " "

Production for:

1st quarter.....	317,000 RM	or	28%	of	permitted	quarterly	level
2nd "	313,000 RM	"	27%	"	"	"	"
3rd "	303,000 RM	"	26%	"	"	"	"
4th "	378,000 RM	"	33%	"	"	"	"
Total 1946.....1,311,000 RM		"	29%	"	"	yearly	"

for raw materials. Machine tool plants in the British zone numbered 168, of which 20% suffered "severe bomb damage." Recently only 15 of the remaining plants have been in operation.

While the rate is a little higher in the U. S. zone, the policy governing production is about the same. Shortage of raw materials permits approval only of orders for firms engaged in necessary production.

It is likely France will get the Saar and thus encourage production to strengthen that area industrially. While the French zone represents a small segment of the German machine tool industry, it is probably getting maximum production under present circumstances.

Production in the Soviet zone is running well over the permitted 1949 level, despite the reparations drain on productive capacity. Reliable reports indicate remaining capacity is being pushed to the limit and almost entirely for Soviet reparations orders.

The Future Outlook

The machine tool industry obviously is a key war potential as evidenced by its status under the 1949 level of industry plan. Its future, therefore, depends on adoption of a system of governing or controlling Germany which will permit the maximum level of industrial activity with the minimum risk of its being turned to war.

This is a challenging problem for the Big Four at the Moscow Conference. The French proposal for internationalizing the Ruhr undoubtedly will figure prominently in the discussions. This plan holds that non-German control of the basic war potentials coal and steel insures control of the rest of Germany's industry and especially its war potential, without the need for adopting anything like the 1949 levels. The concept of controlling German war impulses by economic repression alone seems destined to a back seat.

Final settlement of reparations issues will have an important bearing on the future level of the machine tool and other basic industries. The Soviets make no secret of the fact that transplanting capital goods taken from Germany is not proving successful from a technical standpoint. They are expected to ask a significant amount of reparations out of current production.

The production outlook for the German machine tool industry will improve with the solution of basic issues. Settlement of the issues is prerequisite to economic unification. Without this, the present economic stalemate which grips all industry in Germany cannot be broken. Any thought as to the possibility of Germany recapturing world markets or even being in a position to meet the import needs of neighboring countries traditionally dependent upon her for capital goods is premature under the circumstances.

NEWS OF METALWORKING

Disposal of Remaining Machine Tools Warrants New Plan, WAA Concedes

The government is now convinced that industry cannot absorb nearly all of the $1.5 billion worth of war surplus machine tools on hand.

▸ Army-Navy Munitions Board and War Assets Administration have tentatively agreed with the industry that a new disposal program will have to be effected in the near future.

▸ Industrial reconversion is near completion; the machine tool industry can now deliver new equipment in most categories on normal schedule, and is seriously threatened by the overhanging surplus inventory; WAA's surplus sales are becoming so difficult that recovery will soon fail to match sales costs.

Second Meeting Planned

These facts were explored in a recent meeting of WAA Administrator Robert M. Littlejohn, Munitions Board, the National Machine Tool Builders Association, and the Ford Motor Company and General Motors.

▸ At the next meeting within a few weeks it will be recommended that a new program be established about July 1 and that machine tool surplus sales be wound up within a few months—certainly long before liquidation of War Assets sometime in 1948.

Proposal Involves RFC

Among measures to be proposed will be release of RFC from its obligation to lease or rent the $600 million worth of tools it owns to operators of government-owned plants at 1% of value per month. These tools are part of the surplus threat and NMTBA wants RFC empowered to release them to WAA for sale to the operators. If and when business activity declines, these machines will be thrown back into RFC's lap, perhaps to the extent of $500 million. It should be explained, however, that the 1% per month, or 12% per year, is a high rate of return to the taxpayers, for the present and so long as it lasts.

Military Reserve Considered

A second hope for substantial disposal is to the military reserve. A team of Munitions Board inspectors is in the field, selecting machines for inclusion in a stand-by of 80,000 units which would be authorized by pending legislation, permitting the transfer to a proposed national reserve or other administrative body, without payment in cash.

Disposal to Schools

Additional legislation is under study which would place in reserve another 200,000 machines, transfer of title to be made without payment.

▸ A third proposal suggests giving machines, perhaps for $1 each, to educational institutions. An unwieldy donation program has heaped criticism on WAA. It is suggested thousands of vocational schools and colleges would accept surplus tools if properly presented.

▸ Exports are a fourth avenue, but would represent small volume. Reconditioning is important to preserve the builder's reputation.

Many Head for Scrap

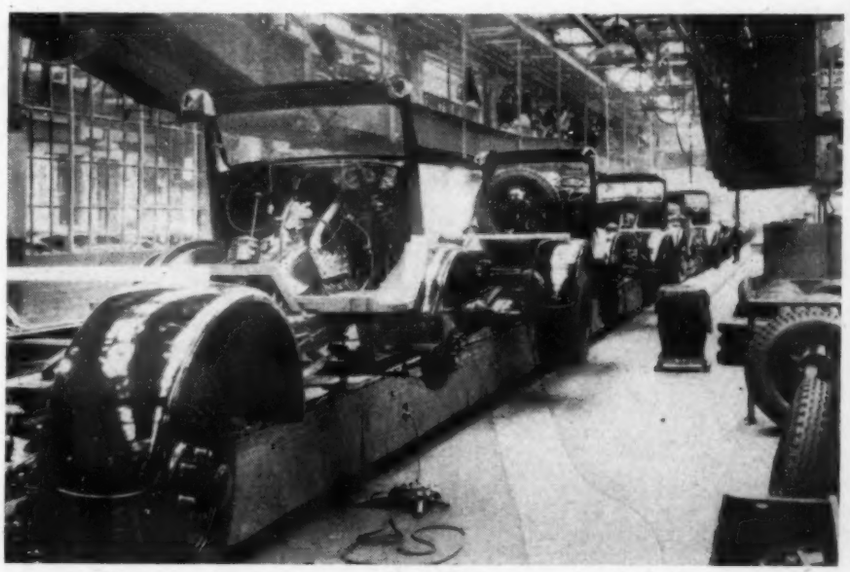
Inevitably, a large volume of machines which nobody will buy or accept free, and which the military deems unworthy of reserve, will have to be scrapped to overcome storage costs. When that happens, the government will recall wistfully the superhigh scrap prices of the 1947 winter.

▸ The task ahead was indicated at the WAA meeting in figures. WAA has 275,000 units in inventory that costs $1,100,000,000. It expects owning agencies to declare surplus about 125,000 more units that cost an additional $500 million—over a billion and a half in all. Up to now, WAA has sold 120,000 pieces that cost $480 million. Of the round total of $2 billion in surplus, only about one-quarter has been sold.

Disposal Rate to Decline

The annual rate of disposal, as of Dec. 1946, was $600 million. At that rate, WAA could dispose of the whole lot in less than 3 years. Actually, the rate will decline sharply to an infinite curve and complete disposal will never come.

▸ Prewar 1936-39 average production rate of the industry was 50,000 units worth $168 million. In 1946, the industry delivered 70,000 pieces worth $327 million. Unfilled orders in January this year totaled $162 million. In 1940 there were 940,000 machine tools in use in the U. S.



England's Economic Hardships—This idle assembly line in the Ford plant at Dagenham, England, bears mute evidence of the fuel shortage crisis. 80,000 workers were made idle in this plant alone. Dwindling fuel stocks precipitated a major shutdown in the country's industrial plants. The effects on British production will be felt for a long time to come

Gaging Business

Productivity on the Rise

Productivity appears to be rising in the metalworking industry. A number of companies report that productivity per man is back at the prewar level or is slightly higher. These favorable results are partly accounted for by uninterrupted operations which the metalworking industries have enjoyed recently.

Incoming business in most lines has been sustained at or near a postwar peak. Manufacturers are hesitant about venturing guesses as to how long the big demand will hold and are afraid that "second-round" increases in labor rates will necessitate higher prices which will restrict buying and hurt production.

Labor Shortages Reported

Labor shortages are reported from numerous metalworking centers, the worst spot being the Chicago area. Skilled machinists and toolmakers are needed by many firms. Engineers, physicists and chemists are being sought by prominent firms, some of which say that their chief competitor for technicians is Army and Navy.

Steel Pipe Sold Out

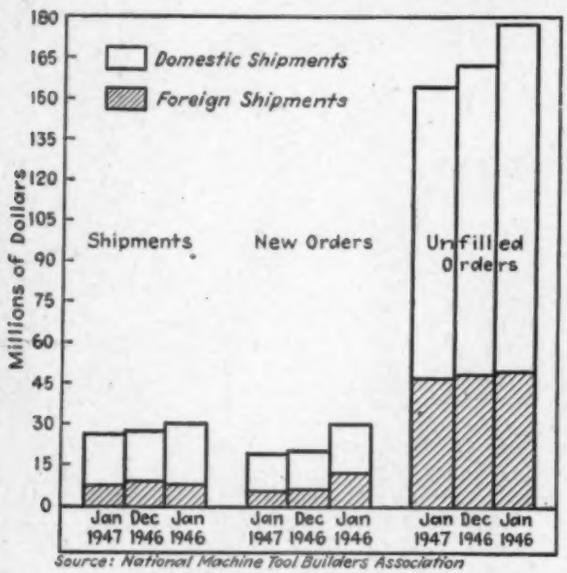
Steel demand continues fantastically high. Steel pipe is sold out until late next year and bridge fabricators are booked solidly for over a year, with many important new projects coming up. Sheet consumption shows no abatement and will be tight all year. Operations have been going along even better than at the peak January rate, the only threat being the critical tightness in the scrap supply. Mills are paying in some cases steep prices to get scrap to keep open-hearths running.

Copper Is Tightest

Production of most metalworking companies is being paced by available supply of short items. Steel, castings and copper are causing anxiety, with copper the toughest to get. Steel and castings, in fact, have eased a bit for certain users. Some machine tool builders have dozens of units completed except for motors, with deliveries of machines delayed for weeks. Aluminum isn't as short as it was. This year output of aluminum, including secondary material, is expected to total 1,400,000,000 lb. Aluminum interests would like to see the tariff on bauxite removed to bring in first-grade foreign bauxite and conserve the domestic supply.

Small Motor Output Big

Heavy electrical equipment makers are as bogged down as ever, so far as backlogs are concerned. Orders placed today for big power-generating units cannot be delivered before 1950. The pile-up of orders for small motors is as great as it was six months ago, despite the fact that production is at twice the prewar level. Manufacturers point out, however, that they could double their output of small motors if they could get the necessary materials. Fractional horsepower motors are being made at 2½ times the '38-'39 rate.



Source: National Machine Tool Builders Association

Machine Tool Shipments Decline—January figures for the machine tool industry are down both from the preceding month and from a year ago. Total shipments, in millions of dollars, total 26.5, of which 7.1 was in foreign business. New orders totalled 18.9 with 5.5 foreign, while cancellations represented 1.5 of which foreign cancellations were .2. January backlogs came to 154.7 and foreign orders dropped to 46.4

Construction Machinery Active

Construction equipment builders are fully engaged, trying to make a dent in their huge backlogs. There is a great vacuum of all types of construction equipment not only here, but all over the world. Manufacturers are plagued by serious shortages of steel shapes and plates.

Household appliance makers are limited only by their productive facilities. Refrigerators, electric ranges, heaters and other appliances are being produced in growing quantities. Only in vacuum cleaners and laundry equipment is there evidence of a slackening in demand.

Machine Tool Sales Dip

Machine tool sales have dipped the past few weeks. Conditions continue spotty, however, with builders of heavy machine tools and special tools quoting long deliveries, and makers of general-purpose machines able to ship units to customers on a normal prewar schedule. Progress is being made in cutting down backlogs in general, which now are at the lowest level in eight years. Prospects are good for a pick-up in orders as the automotive industry proceeds with retooling later in the year.

Export Sales Off

Foreign sales have been almost 30% of the industry's total business, but indications are that the percentage of export trade to aggregate sales has dropped sharply for many companies. Sweden and Switzerland are placing substantial orders here. Several builders have had very good sales in England, despite the rigid import restrictions imposed. France is expected to buy extensively in this country if it is granted a substantial loan by the World Bank. Exports of mechanical presses to the British Isles have been of considerable volume.

Surplus Competition Keen

Competition from surplus general-purpose machine tools still constitutes a hazard for the industry. Many sales of new machines have been lost because users could secure a satisfactory surplus substitute.

Automobile makers are assembling cars and trucks at a rate exceeding 100,000 units a week. Production promises to hold at that figure indefinitely unless materials shortages interfere. Chances of such interference are diminishing day by day. Farm implement and tractor manufacturers are turning out units at a record peacetime pace.

Steel Demands Continue Heavy; Mills Reluctant to Boost Monthly Tonnage

PITTSBURGH—Steel demand may best be described as continuing enormous. New orders thus far in 1947 are ahead of the same 1946 period and are estimated to be 40% in excess of current consumption.

In an effort to clear the export situation—blamed in numerous circles for tightness of the domestic market—a report on the 1946 movement abroad shows there were 4,981,791 net tons of iron and steel shipped, exclusive of scrap. This compared with 7,124,000 net tons in 1941.

Finished Steel Exports

On the basis of a preliminary report by the Department of Commerce on production of finished steel in the U. S. for 1946, the past year's volume of exports would be 9.4% of the total made. In 1941, it was 11.5%. If 1941 is considered an abnormal year for steel exports, the figure for 1939 is 7.0%.

"Premium" Volume Low

One important company in the steel manufacturing ranks did not export anywhere near 9.4% of its production last year.

Local steel interests do not believe the volume of steel products moving in the "premium market" represents more than an exceedingly small percentage of steel being made. It is conceded, however, that quoted prices of $200 per ton and more for sheets attract attention, in many cases far out of proportion to the importance of each transaction.

Continued difficulties in obtaining materials and motors for new equipment have revised to later dates the starting times on new sheet mill equipment. Thus, the importance of new mills in helping to fill the huge unfilled orders for sheets in 1947 has diminished.

Railroads Bring Pressure

Railroads and their suppliers are assisting in a widespread campaign to obtain more steel for new equipment. Political pressure also is being exerted on the mills in this direction. Shortages of various types of cars—particularly box cars—make this an important business topic. Steel companies are reluctant to increase steel commitments above the roughly 160,000 tons per month promised for the second quarter of 1947 on the ground that anything in excess of this total probably could not be utilized immediately.

Demands for structural shapes have been increasing and will find a tight market during the remainder of the year. This material must compete for mill positions with other heavy products, including railroad steel, and it gets raw steel allotments after light-flat rolled requirements are more or less satisfied.

Attachments Often Make Specials Out of Standard Machine Tools

CLEVELAND—Demand for socalled standard machine tools in the Cleveland area has dropped steadily during the past three months. Yet analysis of orders being booked indicates a great percentage of machines designated as special machine tools are, in fact, the basic standard machine with special semi- and automatic attachments.

Principal reason for demanding these special attachments grew out of the low productivity rate for employees in plants where standard machine tools were in use. With some companies experiencing as little as 70% productivity, management found it wise to equip their shops with machines which would produce in spite of indifferent workmen.

Surplus Effect

Machine dealers and manufacturers alike are feeling keenly the effect of a market flooded with surplus machine tools by WAA, at prices reduced to bargain counter levels.

One small builder reports an exceedingly thin market at the present time, with as many inquiries coming from abroad as from domestic users. He hopes major industries, including automotive, starts on new tooling programs soon.

Evidence of a buyers' market in new machine tools is readily available. More buyers are insisting on demonstrations to convince them a machine will meet exacting specifications on work to be performed. While this trend has been in progress since the end of the war, it became pronounced by mid-January of this year.

Fabricators May Be Spared From Basic Steel Demands

WASHINGTON — Unlike last year, when the 18½-cent steel settlement was forced on fabricators as well, Philip Murray, United Steelworkers' chief, indicates the CIO International Union will not insist on the same increase from steel fabricators this year. Possible Wagner Act changes compelling unions to bargain may be an important factor in this changed attitude.

This attitude is heartening to steel fabricators who banded together to demand they be spared from having to fulfill agreements made between the basic industry and union negotiators. They insisted on legislative action, if necessary, to avoid demands being foisted upon them without even representations in the negotiations. They indicated they preferred to strike agreements on a local level.

Model Turbine Testing—For use in Allis-Chalmer's hydraulic laboratory, this casing simulates all-welded or riveted hydraulic turbines. Here a worker is using a portable grinder to dress a model of a hydraulic turbine spiral casing fabricated from all welded plate steel. These casings surround and distribute water to main turbine parts which fit into central circular space. Expected efficiencies in building the nation's hydro power facilities can be predicted from model tests

Shortage of Freight Cars and Copper Blamed for Chicago Business Decline

CHICAGO—Output of Chicago area metalworking firms is tending to decline as a result of two comparatively new factors: shortage of boxcars and an acute lack of copper.

The Illinois Manufacturers Association asserted that unless copper supplies increase soon, "output of hundreds of Illinois companies will be much reduced."

Curbs Output of Bare Wire

General Cable Co. is suffering from the shortage. The firm will make no bare copper wire until the supply of metal is eased, and wherever possible the company is substituting aluminum for copper.

Belden Manufacturing Co., in addition to needing copper, also is short of insulating materials, Whipple Jacobs, president, said the copper shortage will definitely limit production.

With copper a necessity for the electrical components of many types of machines, Harvester, Electro-Motive division of General Motors, Pullman-Standard and other metalworking plants face difficulties if supplies are not increased.

Transit Survey Launched

On the boxcar shortage, the Chicago Association of Commerce and Industry is conducting a survey of 420 firms, accounting for approximately 85% of the rail freight tonnage moving in and out of the Chicago district, to determine the severity of the transit tieup. Preliminary results show that manufacturers are definitely hampered. Inland Steel has had output affected by the car lack, and the firm's use of trucks for shipping went up 100% in a month. Harvester has had output slowdowns due to material shortages that were traced back to the car shortage. Waukegan and Joliet plants of American Steel and Wire were closed for several days because tank cars to bring in bottled gas were unavailable.

Meanwhile, Chicago area freight car makers continue to be hampered by the lack of steel, and see no immediate relief of importance.

Future Diesel Engine Business Looks Bright in View of Demand

WASHINGTON—Diesel engine industry is adding aggressive promotion to several strokes of good fortune and faces a bright future.

Last year's coal and power strikes, with no assurance against reptetition, are inspiring building managements to put in their own diesel generating plants.

Railroads, with diesel locomotives, can maintain full schedules despite coal shortages.

Navy used 35,000,000 diesel engine horsepower in the war, and the men who ran them are at home talking up diesel power to bosses.

Civilian Backlog Heavy

While the industry was delivering diesel power to the Navy, it accumulated four years' demand for civilian use, and is just beginning to whittle down the huge backlog.

Harvey T. Hill, director of Diesel Engine Manufacturers Association, is telling industry that diesel is the most efficient of all prime movers, gets more energy from fuel than does any other engine or turbine.

American Diesels Superior

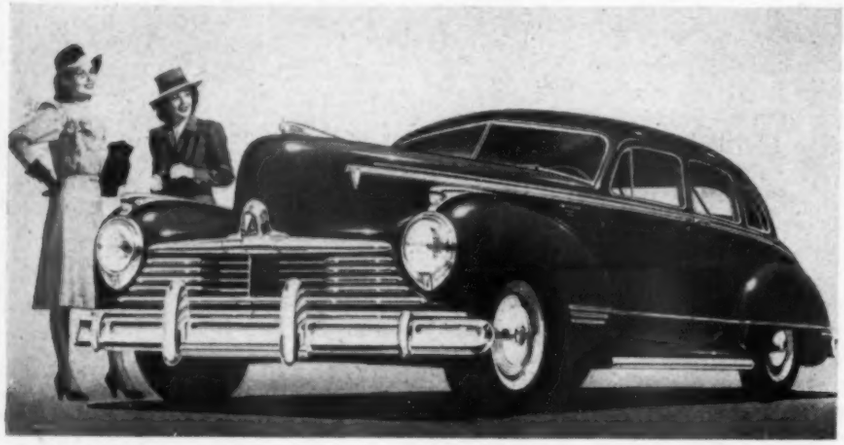
Before the war, several European diesel engines were superior to U. S. makes, but today, says Hill, all American diesels are superior to any others anywhere. German makes, particularly, dominated the South American market, but they are out, and U. S. producers see a large potential foreign market.

Yes, says Mr. Hill, answering questions by an AMERICAN MACHINIST reporter, 94% of all locomotives bought in 1946 by U. S. railroads were diesels. Reasons: much cheaper to operate than steam, permit faster schedules, need less maintenance, thus are available for service more than 90% of the time.

10,000,000 Hp. Is Goal

In 1939 production of diesel engines in the U. S. was 2,300,000 hp. In 1944 it reached an all-time peak of 35,000,000 hp. The Association is aiming at 10,000,000 hp. in 1947, and thinks it can maintain that level as the average for ten years.

The diesel market reads right across the power board: municipal power plants, for service and standby; plants of rural electrification administration; all big buildings and institutions, towboats, tugs, fishers, and ships; machinery for all types of construction work; trucks, particularly the large ones in continuous heavy duty; heavy buses; mines, mills, factories; drilling, pumping, pipeline operation; rail and industrial locomotives.



Trim Identifies New Models — Changes in the new 1947 Hudsons were restricted to interior and exterior trim and were accomplished without cessation of production. Available in 15 different types, this year's Hudson features a heightened grille, more advantageously positioned bumper guards, new upholstery trim and continued emphasis on various patented safety devices

Technical Book Wins Place Among 50 Books of the Year

NEW YORK—"Precision Hole Location for Interchangeability in Toolmaking and Production," the 448-page book written by J. Robert Moors and just published (AMERICAN MACHINIST, Jan. 16, p. 242) by the Moore Special Tool Co., Bridgeport, Conn., has been selected as one of the Fifty Books of the Year. Winners were placed on exhibition at the Grolier Club here, beginning March 12.

Jury remarks in the catalogue include ". . . quite the outstanding halftone printing of its kind submitted this year. A treatise on precision work should have the same quality in its makeup. This volume has brilliance and clarity of layout, presswork and reproduction.

The book was produced under the supervision of the Fred Wittner Advertising Staff.

Detroit

AUTO FIRMS CONCERNED OVER OPERATING CAPITAL... ENGINEERS PUSH FOR STEEL SPECIFICATIONS... SHEET SUPPLY STILL TIGHT

Emphasis on Working Capital

Top executives in many companies, small and large alike, have temporarily at least turned their attention away from shop problems to difficulties in the fiscal departments. Working capital is shorter in such companies as a whole than it has been in many years.

The cases run parallel: Company A, for example, borrowed substantially in the closing stages of the war to expand in anticipation of big consumer goods volume. Materials slowed down its production to the point that the loaning bank has installed a representative in the treasurer's office. Company B borrowed to acquire new facilities, found its machinery markets stopped by the recent hiatus, and is now being watched almost on a day-to-day basis by the RFC. Company C set up a companion operation, floated a stock issue which did not produce the needed cash, and is straining to keep afloat.

Postwar Business Misjudged

None of these situations—and there are many more like them—reflects anything worse than management misjudgment over the extent of postwar business. Even today, a sudden turn would bring them quickly out of the woods. However, the concerns now are vulnerable and worried.

These problems are not exclusive to smaller companies. General Motors, it will be remembered, recently floated loans into the millions of dollars, solely to replenish working capital strained by the impact of inventory carrying, reconversion expense, expansion planning and commitments; the failure of output to match expectations, working forces and schedules, and other factors.

In this general shriveling of working capital may be found one good reason why tooling companies have not had the big business volume they had anticipated in recent months. Enough retrenchment programs are currently being pursued to register at least some effect on the extent of equipment buying.

Specs for Cold-Drawn Steel

Engineers in the auto industry are devoting considerable attention to steel specifications, with their moves radiating out in several directions.

For one thing, an effort is being made to develop a set of standard specifications on cold-drawn steel. Setting up of standards on tensile strength and other physicals would enable automotive purchasers to do what they have wanted for several years—buy to precise specifications.

In the past, steel mills have taken the view that specs on cold-drawn are most difficult to set up, but at least one auto company, having done its own testing, feels otherwise.

Interest in Hardenability

Another steel activity of interest is the forthcoming publication of further hardenability bands for various grades of steel. This effort, under the joint sponsorship of the American Iron & Steel Institute and the Society of Automotive Engineers, grows out of constantly increasing buying on a basis of hardenability rather than physical specifications. Use of hardenability as a yardstick of performance has been increasing steadily since the first tentative hardenability bands appeared a few years ago, and seems to be growing.

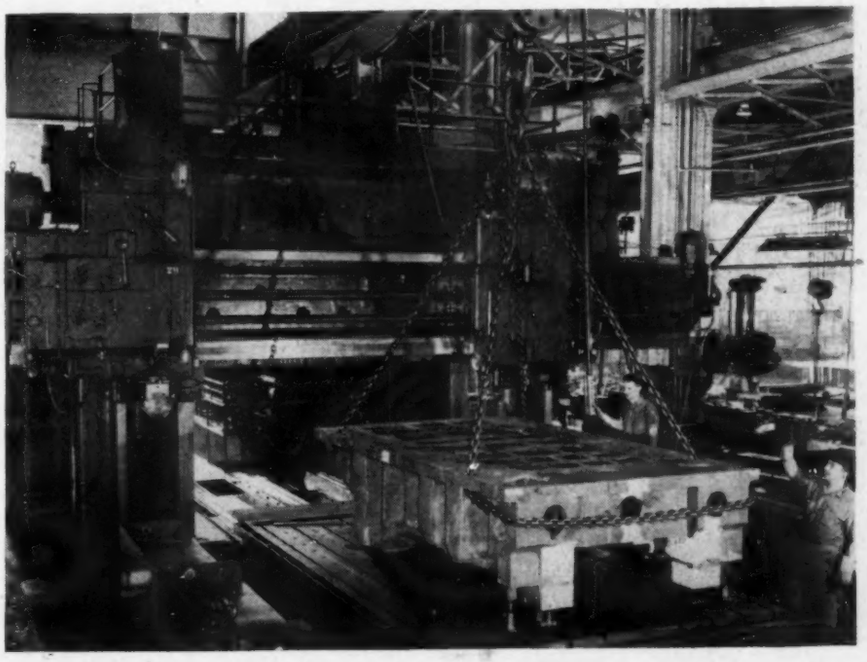
Also on this score is likelihood of early disappearance of most National Emergency lean alloy grades, and complete abandonment of the NE prefix for such grades. It appears that only the 8600 series will be retained anywhere near complete. The closely related 8700 series will disappear, and so will the bulk of the 9400's, whose wartime use was second only to the 8600-8700 groups. And those grades which are kept in use will be given SAE prefixes, on the grounds that the emergency nature of their development has now become history.

Pig Iron Causes Worry

Steel continues hard to get. One customer was told recently by mill people that there was no letup in sight on sheets until mid-1948.

Pig iron is also worrying the manufacturers today. Some March schedules are being cut back on this account, and the shortage is expected to continue through the second quarter. This is the one main barrier at present to anticipations the industry will build about 3,600,000 passenger cars and 1,100,000 trucks during 1947. Copper is also exceedingly scarce today, with no immediate relief in sight.

Auto companies are complaining over the proportion of flat-rolled steel they are getting. The Automobile Manufacturers Association claimed that during the first eight months of last year its members received only 26% or so of all flat-rolled, against a prewar consumption between 35 and 40%.



Largest Auto Milling Machine — Five flat railroad cars were needed to transport this 370,000 lb., two-headed milling machine to Detroit. Believed to be the largest in operation in the auto industry, it is at the Die and Machine Plant of Fisher Body Div., General Motors Corp. The specially built machine has a 38-ft. bed, an 18-ft. table and operates with 178 hp.

Steel Spokesman Cites Shipment Data In Refuting Criticism of Industry

NEW YORK—Bolstering his claim with figures, George W. Rose, secretary, American Iron and Steel Institute, asserted distribution of steel has been on a fair basis generally. He addressed the American Institute of Bolt, Nut and Rivet Manufacturers recently.

Pointing out the Institute's records date back only to 1940, he said the bolt, nut and rivet industry alone received 1.5% of the total shipments of finished steel products in 1940, and during the first 11 months of 1946 the amount was 2.1%. During the latter period, the actual tonnage shipped to that industry exceeded the total 1940 shipments by more than 200,000 tons, he revealed.

Steel for Freight Cars

Citing the freight car situation, Mr. Rose said car and locomotive builders, through Nov. 1946, received 3.6% of the total shipments of steel as against 2.6% in 1940, a decided gain both in tonnage and percentage.

In response to criticism of the automotive industry, he explained that 1940-1946 comparisons were difficult because of work stoppages. He pointed out, however, that during a recent week last month, a total of more than 97,000 cars and trucks were produced, against the average weekly production in 1940 of 85,000 units.

Machinery Quotas Up

Construction in 1940 received 10.8% and in 1946, 9.3%, and figures for machinery are 4.1% in 1940, compared with 6.9% in 1946.

"The steel industry has been accused of shipping excessive quantities of steel for export," he said, "but the figures do not back up the accusation, for while in 1940, 17.7% of our shipments went into the export market because of war demands, only 5.9% or just about a normal amount, went into exports during the first eleven months of 1946." The percentages are based on direct exports from steel manufacturers. Warehouses have gained considerably in their receipts of steel.

Six-Day Program of Western Metal Exposition Outlined

SAN FRANCISCO — The complete program for more than 75 technical papers, lecture courses and roundtable discussions at the fifth Western Metal Congress & Exposition in Oakland, Calif., March 22-27, has been announced by William H. Eisenman, managing director of the show and national secretary of the American Society for Metals.

Metalworking Courses

Courses offered will cover the range of metalworking from heat-and-cold-resistant metals to electronic research, Eisenman said. He added that in almost every instance, nationally-renowned leaders in their fields will deliver the papers or lectures. Roundtable discussions will be led by outstanding manufacturers, industrialists and metal experimenters.

The American Welding Society will hold special sessions at the exposition, as will the American Foundrymen's Association. Aviation industry scientists, designers, engineers and industrial executives will participate in a survey of metals used in that industry, particularly the performance of metals at extremely high temperatures, as developed in newer types of jet propulsion aircraft.

British Fair Opens May 5

LONDON—The first British Industries Fair in seven years will be held May 5 to 16 with the lighter industries exhibiting here and the hardware and engineering industries (including machinery) displaying in Birmingham. Only producers or sole selling agents may exhibit, and products are those of the United Kingdom only. Details are available from British Consulates or Trade Commissioners.

Mills Expect High Output Despite Scrap Shortage

PITTSBURGH — Steel mills will get through the winter without being held up by the scrap shortage. A particularly high rate of production during the first half of this year is desired by steelmen to work off some of the more critical demands and make the cry of shortages less prominent. Cooperation on the part of customers in returning scrap is helping.

The situation in natural gas is bad for the mills in this section; finishing operations are being affected along with open-hearth melting when a cold wave strikes the territory.

Government Sets 21½¢ lb. Price On Remaining Stocks of Copper

WASHINGTON — The government revealed that its remaining supply of 55,000 tons of copper, contracted for in South American markets last fall, will be allocated and sold within the next few months at the acquisition cost of 21½¢ a lb. or the market price, whichever is highest.

The announcement on Feb. 28 gave rise to belief the then market price of 19½¢ might jump another 2¢ to meet the government price. The Civilian Production Administration will continue to allocate copper stocks on a monthly basis.

3,000 Exhibitors Expected

BRUSSELS, BELGIUM (McGraw-Hill World News)—A total of 3,000 exhibitors have taken space in the International Commercial Fair which will be held here from April 26 to May 11. Twenty countries exhibiting in 26 industrial groups will participate.

Domestic Steel Supply Claimed Adequate for Export Allotments

WASHINGTON — American manufacturers traveling in Europe have complained of seeing foreign industries rolling along with plenty of steel from the United States when they themselves couldn't get it. Department of Commerce Office of Foreign Trade, which approves allocations for export, says domestic steel supply of all types is now adequate to those "willing to dig for it."

Copper and Brass Net Profits

War Assets has a non-ferrous metals inventory of about $60 million; about 40% aluminum; 50% copper and brass and basic copper alloys; 10% of miscellaneous alloys. Most of the items are non-standard and are suitable only for melting back to basic metal; 75% being sold for scrap. All non-ferrous products are sold on sealed bids; copper and brass products are bringing more than acquisition cost.

Surplus Steel Status

Too many people, War Assets told AMERICAN MACHINIST, are hoping to get steel products from surplus. Practically none of WAA steel stocks are standard. Nearly all are sold for conversion, at a large discount. For instance, alloy steel bars worth about $125 a ton were sold for $35. Some items are sold solely for melting and recovery of alloys. A small amount of tool steel is made by purchasers into chisels, crowbars, etc. In stock is $6 million worth of steel rope; a 10-year supply of music wire.

Washington

MACHINE TOOLS OFF REIMPORT LIST . . . JOINT PROCUREMENT BILL SUPPORTED . . . INDUSTRY UNITS AID DEFENSE

Reimport List Revised

The State Department and Foreign Liquidation Commission have revised a list of surplus equipment abroad recently authorized to be returned here for sale. Struck off the list are boring mills, lathes, milling machines, presses, pumps, cranes, diesel engines, sawmills. Retained on the list are mainly printing machinery, industrial sewing machines, some textile machinery. Office of War Mobilization erroneously listed the machine tools as in "critical" supply here.

British Buyers Disappointed

British Embassy officials told AMERICAN MACHINIST they are disappointed in their plan to buy large quantities of industrial machinery with part of their $3.75 billion loan. They spent $496 million in the U. S. in 1946, only $22 million or 5% of which went for machinery.

Main reasons for this low figure, they said, was unavailability and slow delivery of U. S. equipment. Other reason was that British had to buy more food than expected, at higher prices, 24% of total. Tobacco was 32% of total, for which the English were criticized in Commons. Empire government drew $600 million of the loan in 1946, $200 million more this year, and will soon take another $200 million. The credit is available to them through 1951. British economists figure they are losing 40% of loan to inflation, will lose still more if they pay it back in deflated values.

Reminder on Depreciation

A good many manufacturers are carrying production equipment on their books at its cost several years ago and are not charging depreciation at current cost of replacement. This means that since they have not allowed for sufficient equipment depreciation in their selling prices, they will have to take dollars from their reserves, or from loans, for replacements when necessary. Machinery and Allied Products Institute will soon issue a report on the subject.

Military Procurement Bill

Army and Navy's joint procurement revision bill (HR 1366 and S 222) is before the House Armed Services Committee (combined military and naval affairs committees) for approval. Military procurement chiefs told AMERICAN MACHINIST they expect "excellent bi-partisan cooperation." Revised procurement practices is one thing the Army, Navy, Democrats, and Republicans all agree on.

The bill provides that bulk of purchasing shall still be on advertising and bids, but it would permit negotiations: (1) in a national emergency; (2) when a contract is for research and development; (3) when the purchase of job is classified for security, (4) for standardization and interchangeability of parts; (5) when special quality must be obtained; (6) when bids received are determined not reasonable.

Bill declares policy that purchases shall be split, when feasible, for handling by small business.

Patent Exams Coordinated

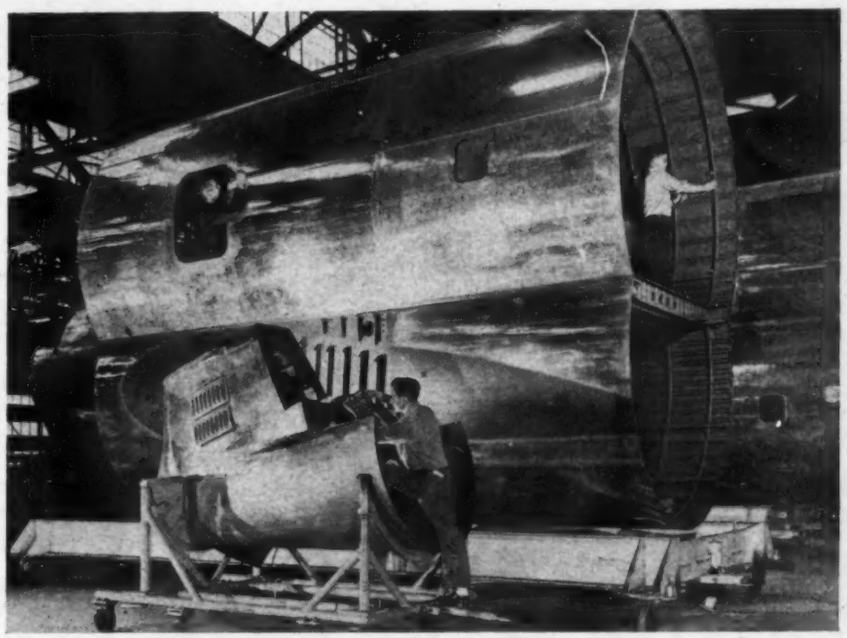
Prior to a change last month, the 754 Patent office examiners worked under five supervisory examiners, each of whom was responsible to the Commissioner. Included in recent administrative changes by Commissioner Casper Ooms is the creation of Executive Primary Examiner. This office is responsible for coordinating all patent examinations and reporting to the Commissioner. Also, a new Office of Executive Examiner for Trade-Mark Operations coordinates trade-mark work.

Harriman Acts on Protests

Secretary of Commerce Harriman has scotched efforts begun in Wallace's regime to move the Divisions of Simplified Practice and Trade Standards from the Bureau of Standards into the Department's Office of Domestic Commerce. Industrial, distributor and buyer groups had protested the move to Congress and to Commerce.

Industry, Science Harnessed

Military planners are "harnessing the genius" of American industry for national defense purposes through formation of industry advisory committees. Meanwhile a personnel program is being organized to make the best possible use of scientific and engineering talents, both civilian and military, in peacetime and war. The committees, when formed, will assist the Board "in planning for future emergencies," both through creation of an industrial mobilization plan and in the stockpiling program. The plan is expected to bring a high degree of peacetime efficiency in the fields of industrial mobilization and scientific research and development.



Stratoliner Fuselage Sections—Seven fuselage sections go into the new Boeing Stratocruisers and Stratofreighters. Shown here are the largest, for the center structure, and the tail cone, which is in the foreground. The latter one, which weighs 55 lbs. and is 4 ft. 4 in. at its widest point, is 4 ft. 7 in. high which contrasts with the 4150 lb. weight of the larger unit, which measures 15 ft. 2 in. high and 11 ft. across at the widest spot

New Products of Magnesium Shown In Combined Services-Assn. Exhibit

DAYTON, O.—Hundreds of visitors from almost every state gathered here for the 3-day exhibition of what magnesium is doing and can do. The display was held at Patterson Field where adequate exhibition space was available for members of the Magnesium Association to show products and for the Army and Navy to show planes, engines and turbines.

▸ Many exhibits had this statement: "Magnesium is lighter than steel in applications where compression, weight and modulus of rigidity are prime factors and the increase in mass is not prohibitive." In other words: steel where a tensile loading is involved; magnesium under compression loading for weight saving and lower-cost machining. The statement that magnesium can be machined twice as fast as cast iron was frequently heard.

A quick turn disclosed some interesting consumer products, such as Brooks & Perkins "Featherweight" wheel-barrow (*AM*, Dec. 5, 1946) and a 50-lb., 16-ft. canoe, both made almost entirely from magnesium (sheet, extrusions and castings). Dow Chemical had many exhibits including a rowboat, airplane luggage, and huge spools upon which nylon and similar threads are shipped at great saving in freight cost. Dow also had displays of both painted and plated magnesium parts, such as trays and door handles.

One American Magnesium exhibit, from Johnson & Bassett, Inc., showed a section of an 89-ft. wool-spinning mule spindle which saved 1074 lb. over malleable iron.

▸ The Wilton Co. showed an aircraft vise with swivel base and 3½-in. jaw opening that weighed only 12 lb., about one-third as much as a similar vise in steel.

▸ Magnesium ladders by White Aircraft Corp. seemed to attract unusual attention, as well as the stepladder made from formed magnesium sheet. The 24-ft. extension ladder weighed 24 lb., compared with 56 for wood.

▸ Coldwell lawn mower was reduced in weight 17½ lb. with magnesium parts such as side frames and wheels.

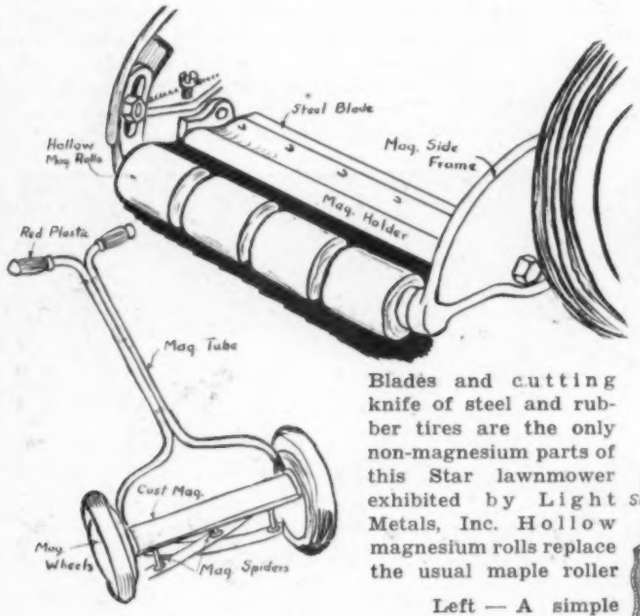
▸ Three interesting processing methods were shown by Northrop Aviation Corp.; hot-forming magnesium in an Erco stretcher, electric heating of magnesium when dimpling rivet holes, and an automatic Heliarc welder for butt-welding sheet. In making spoilers for the P-51 airplane, they saved $23,410 in material and 8060 man-hours at $2.50 each.

▸ Throughout the exposition, Hydropress, Inc., operated one cold-chamber machine, die-casting ashtrays to demonstrate that handling magnesium is not a fire hazard.

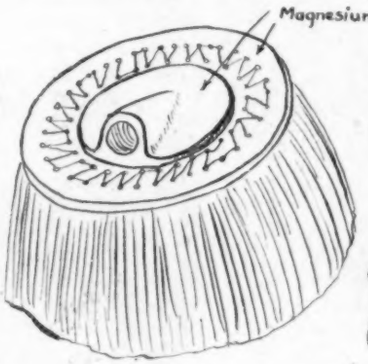
Comparison of Metals

Northrop gave this interesting tabulation of the relation of several different metals when compared on the basis of ultimate tensile strength in lb. per cu. in.:

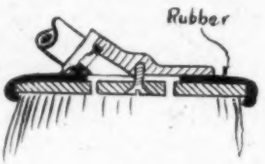
Steel	7.1
24ST Aluminum (wrought)	6.2
Beryllium Copper (160,000 psi.)	5.5
Magnesium (Dow C)	5.25
220-T-4 Aluminum alloy	4.5
Manganese Bronze	3.7
Beryllium Copper (100,000 psi.)	3.5
Aluminum Bronze	3.3
195-T-6 Aluminum alloy	3.25
356-T-6 Aluminum alloy	3.15

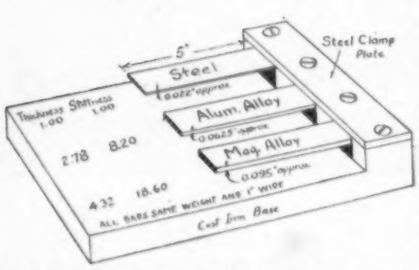


Blades and cutting knife of steel and rubber tires are the only non-magnesium parts of this Star lawnmower exhibited by Light Metals, Inc. Hollow magnesium rolls replace the usual maple roller

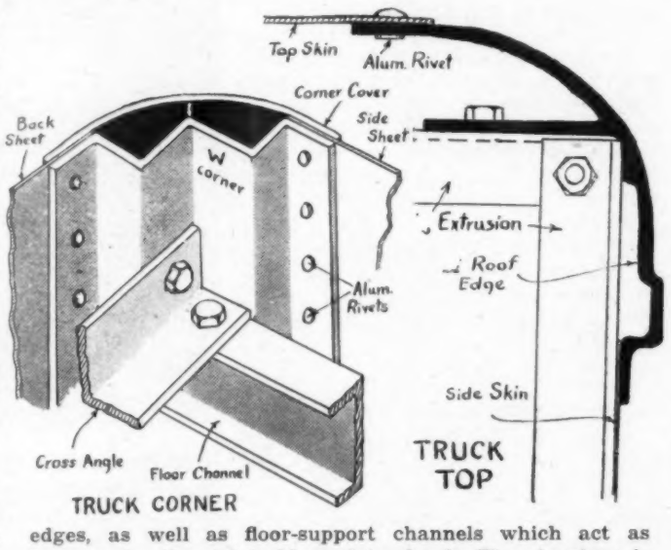


This fountain brush has head and connector of magnesium, as well as the handle. Pike poles of tube weigh half what a wooden one does





Left — A simple exhibit permitted spectators to feel the difference in stiffness between magnesium and aluminum alloys compared with steel. Three equal-size bars gave a similar comparison of weights



Right—About 100 all-magnesium truck bodies have been produced by Revere Copper & Brass. Here are sketched its features—extruded magnesium rear corners and roof edges, as well as floor-support channels which act as formers for the sheet side and to panels. The structure is bolted and riveted together with aluminum-alloy fasteners

Industry-wide Union Bargaining Policy Forms Major Shadow on Labor Peace

WASHINGTON—As usual, chances of avoiding serious industrial strife through 1947 hinge largely on the whim of unpredictable John L. Lewis, United Mine Workers' boss.

Confidence that there won't be a steel strike exists on both sides in the steel industry. Peace in steel should be reflected as well in fabricating plants. Continued production in metalworking, then, may well depend on what happens in coal.

Major Obstacle Seen

Many coal operators, particularly in the captive mines group, are in a mood to sign up with the United Mine Workers. Major obstacle seems to be Lewis' insistence on an industry-wide agreement.

Any Lewis retreat on this issue may have to come indirectly through a Wagner Act change requiring him to bargain. Or voluntarily. As much as Congress would like to scuttle industry - wide bargaining, which often cripples whole industries, it can't seem to find effective means to do it.

Operators who produce a majority of coal tonnage won't let the union welfare and retirement fund itself bar a settlement. Congress may limit employer contribution to union-controlled funds or enlarge employer participation in their control.

Welfare Fund at $16 Million

Coal operators will then have to go along with whatever is legal. Many feel the public wouldn't support a finish fight against a concession which Congress condones and which the government has already granted the miners.

The 5-cent deductions for welfare and retirement on each ton of coal mined since the government contract was signed last May has built a fund of more than $16 million in the First National Bank in New York.

Steel Pattern Awaited

Many negotiations are marking time, waiting for a pattern in steel. Some settlements, like that in flat glass, are mere down payments. Even so, industry sources feel a pattern is being established by smaller companies not having contracts with CIO's steel workers. About 100 companies are reported to have settled with the CIO electrical workers for increases ranging from 5 to 15 cents.

Until this month, U. S. Steel Corp. negotiations with Philip Murray's United Steelworkers have centered on non-economic issues. Serious bargaining on wages, with a possible settlement before expiration of the contract extension April 30, can get underway with clarification of portal-to-portal pay rights.

12 to 15¢ Settlement Seen

A "Baby Nathan Report," purported to show Big Steel's ability to raise wages more than 21 cents an hr., without raising prices, will be used by Murray to bolster union demands. Despite this, the settlement is expected to be from 12-15¢.

Whatever limitations Congress puts on portal-to-portal pay, there will be no restrictions on what unions can bargain for. Once a law is passed, the issue will revert from the courts to the bargaining table.

Portal Suits Dropped

Unions have dropped scores of suits since Judge Picard's findings that time spent by the Mt. Clemens Pottery employees in walking and getting ready was trifling and not compensable. In any event, Judge Picard would limit any retroactive payments to last June 10, when the Supreme Court made its ruling.

While some unions, like CIO's United Automobile Workers, are undergoing financial difficulties, the International Association of Machinists, independent, plans to spend $2 million to raise its membership to one million by May, 1948. It will then be 60 years old. Current membership is 600,000, a rise of 100,0000 during 1946.

Strike Fund Assessment

UAW-CIO's 800,000 members currently are being assessed $1 to build up the strike fund, which in November dwindled to $124,000. The union is spending $150,000 a month for strike relief, spent more than $1 million during the General Motors stoppage.

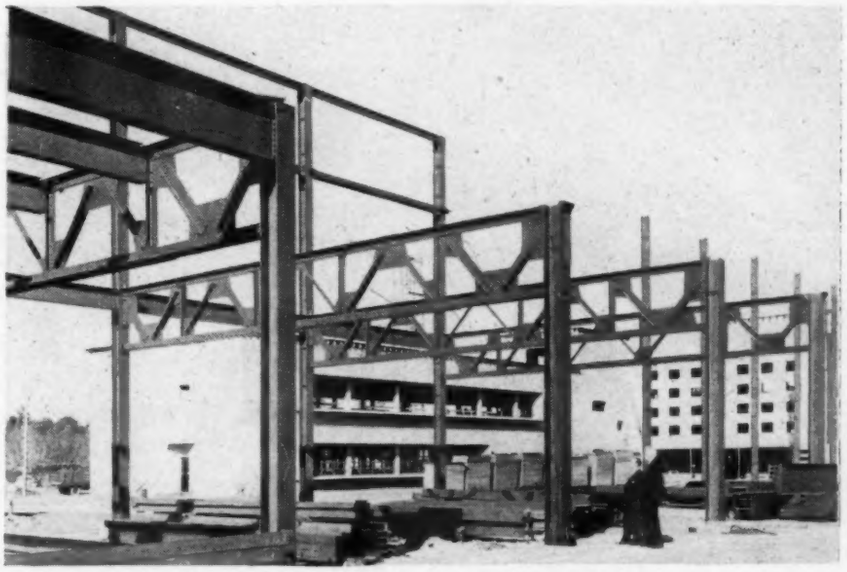
Financial difficulties are attributed by the union to a drop in annual income from $6.5 million during the last year of the war to less than $4 million during the year ending last May 31. Reason given was unemployment because of reconversion layoffs and strikes.

In 12 months ending last May, union treasury balance dropped from $2,185,383 to $158,800. Membership, which hit a record high of 1,242,569 in March, 1945, fell to four-year low of 535,986 last May. Dues have been raised to $1.50 a month.

UAW-CIO Claim Draws Fire

Jurisdictional trouble in the aircraft industry can be expected if the UAW-CIO steps on toes of the International Association of Machinists in its drive to organize the industry.

At a recent UWA-CIO conference in Buffalo, President Walter P. Reuther said the Union aimed to reorganize the wage structure and "take aircraft labor out of competition, so that greater production will result from better engineering and technical improvements, rather than at the expense of low wages."



West Coast Construction—Structural steel for large Chevrolet assembly plant at Van Nuys, Calif., is going up at 100 tons a day as construction proceeds on new industrial plant. Shown is portion of assembly plant proper, eventually to cover 11 acres. In background is two-story administration building expected to be ready this month for partial occupancy

Foreign Report

(BASED UPON REPORTS FROM McGRAW-HILL WORLD NEWS BUREAU)

Australian Tool Competition

MELBOURNE — Australia may yet compete with U. S. toolmakers in the post-war market when $3.3 million worth of tools and gages, many of them of American manufacture and supplied under lend-lease, will become available for export shortly.

The Commonwealth Disposals Commission is offering this amount in drills, reamers, millers, cutters and other attachments as well as many types of gages at public auction in Australian capital cities. Bidders must show proof of their ability to dispose of the bargains in overseas markets, and special safeguards have been adopted to prevent the tools from reaching Australian machine shops.

Australia Hits Jackpot: Because of the Commonwealth's comparatively small share in German reparations, it has been given the pick of German engineering machinery. This amounts to 0.95% of the German shipping and 0.70% of all other reparations items including German external assets.

Aluminum Plant Considered: The Door Company of America has offered to design, erect and initiate in Australia all plant necessary for the aluminum industry, says the first annual report of the Australian Aluminum Production Commission, recently tabled in Parliament. The offer is now under consideration, and further steps towards the preparation of plant, layout, and design await the company's reply, the report adds.

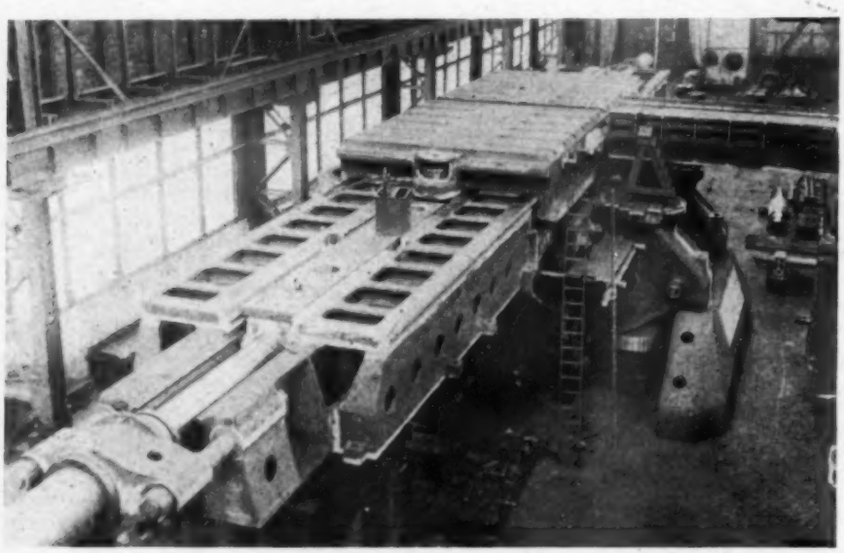
Wartime Factories Converted: Conversion to a peacetime production schedule has kept many Australian munitions factories and arsenals in operation. Orders for civilian goods valued at nearly $3.3 million were handled during the first nine months of 1946. These orders included $1,072,500 worth of general- and special-purpose machine tools, tools and gages, minor engineering tools and repair work; $1,281,060 worth of metal sheet and strip; $324,060 worth of ball bearings; and $51,480 worth of plastics.

Electric Tractors in Russia

MOSCOW—With the latest Soviet-designed electric tractors put through their field tests and orders placed for the first trial lots with plants in the Ukraine and Urals, electric traction in agriculture is becoming a reality for Soviet collective farmers. The 54-hp. motor is fed by a 750-meter cable rolled on a drum installed on the machine to take up the lag as a machine moves in a field. Electric traction is said to be cheaper and permits deeper plowing.

Self-Propelled Combine: Experimental models of a newly designed self-propelled combine have recently undergone final tests under actual working conditions in the USSR, according to Soviet press reports. Built in the shape of a "T" with a cutter bar in front, the combine is maneuvered easily.

Duplex Steel Plant: The first duplex steel plant in USSR was completed recently at the Chusovaya Steel Plant in North Urals. It reportedly differs fundamentally from similar enterprises in the U. S. and Western Europe. In addition to high-grade steel, it will produce vanadium slag.



More Feed Than Press—The mammoth transfer table almost overshadows the 15,000-ton hydraulic press to which it is attached. Data on operation of such presses in Germany are being studied here. The transfer table permitted setting up a piece while another was in the press. Propeller blades, crank cases and other aircraft parts were formed from sheet in a single operation with minimum waste of metal

Holland Auto Imports

AMSTERDAM—Only 2,237 American automobiles were imported into Holland from the date of liberation until Dec. 31, 1946, according to Hendrik Vos, Dutch Transport Minister. Import licenses for a total of 8,232 had been granted for the period. Total number of foreign cars, including U. S. imported, was 7,165.

Jap Reparations Tally

TOKYO—For Allied reparations, the collection of inventory data for machine tools, thermal electric power, ball and roller bearing, and iron and steel plants under custody has been completed. Chemical engineers are now inventorying the chemical plants under custody.

Mexican Rail Orders

MEXICO, D. F.—One of the largest orders for sundry rail equipment given so far by the National Railways of Mexico is the one just passed between that company and the Fundidora de Fierro y Acero in Monterrey, Mexico's largest iron and steel mill. It includes 11,000 tons of rails, one million rail nails, 76,000 screws, and 38,000 small plates and other parts.

Studebakers for So. Africa

JOHANNESBURG—The Studebaker Export Corp. is reportedly combining with Industrial and Commercial Holdings Group, Ltd., for assembly of Studebaker cars in South Africa. Volume is expected to be 5,000 cars and trucks annually, but the plant could handle up to 15,000 a year.

Indian Steel Policy

NEW DELHI, INDIA—Continuation of the 22-year-old protection policy for the Indian Iron and Steel industry appears likely despite the fact domestic production during 1947 is expected to meet only about half of the 2-million tons required.

Names in the News

Howard W. Kane

David E. Johnson

Howard W. Kane, former vice president and general manager of Kane & Roach, Inc., Syracuse, N. Y., has been elected president of the company succeeding his late father, **William E. Kane.**

David E. Johnson has been appointed vice president of The Steel Improvement & Forge Co., Cleveland. For many years he has been superintendent of all company production operations.

Charles E. Smith has been advanced to the newly created position of executive vice president of Towmotor Corp., Cleveland. Mr. Smith joined Towmotor as sales manager in 1941 and has been vice president for the past four years.

James W. Irwin has joined the Ford Motor Co. as assistant to the president and director of public relations. Before organizing his own firm in 1944, he was associated with General Motors and Monsanto Chemical Co.

L. M. Morley, vice president in charge of sales for the Brown Instrument Co., Philadelphia, has been elected a vice president of the Minneapolis-Honeywell Regulator Co.

Gerald Z. Wollam has been appointed assistant to **Ellis L. Spray,** vice president of the Westinghouse Electric Corp., in the supervision of the company's Elevator Div., Jersey City, N. J. and the Sturtevant Div., Hyde Park, Mass.

C. E. Jones has been appointed vice president of Agaloy Tubing Co., Springfield, Ohio.

Ralph E. Gordinier has been named chief research and design engineer for Eco Engineering Co., Co., Newark, N. J., manufacturers of gearless pumps.

Arthur I. Appleton, former executive vice president of the Appleton Electric Co., Chicago, has been elected president to succeed his father, **Albert I. Appleton,** who has become chairman of the board. **John A. Appleton,** was elected vice president.

Marion B. Sawyer has joined Bardco Manufacturing & Sales Co., Los Angeles, where he will be in charge of special motor development and sales.

Ben T. Cowherd has been elected vice president of Republic Drill & Tool Co., in charge of Republic's hardware sales in eastern states.

William Kerber has been named vice president and general manager of the Hanna Furnace Corp., succeeding the late **E. Kay Ford.**

F. U. Conrad

Anton Erhardt

Charles W. Deeds has resigned as president and general manager of the Niles-Bement-Pond Co., West Hartford, Conn., but will continue as a director. **Frederick U. Conrad,** former vice president of the Underwood Corp., has succeeded Mr. Deeds as president and general manager.

Anton Erhardt, Sr. has been named chief engineer of the National Tool Co., Cleveland. He has been with the company 40 years and has been replaced as factory superintendent by **James C. Grossman.**

A. J. Sherman has been named factory superintendent of The Monarch Machine Tool Co., Sidney, Ohio.

H. A. Roemer, Jr., president of Detroit Seamless Steel Tubes Co., has also been elected a vice president of the Sharon Steel Corp.

Merritt D. Hill has been appointed general sales manager of the Dearborn Motors Corp., Detroit.

Justin H. Dickins, retired Captain, U.S.N., has been appointed executive assistant, Gray Manufacturing Co., Hartford, Conn.

Robert A. Nisbet has been appointed superintendent of the Waterford, N. Y. Works of the General Electric Chemical Department.

J. Kenneth Bush, former manager of the West Lockport plant, has been named general plant manager in charge of production and maintenance of all plants of the Harrison Radiator Div., General Motors Corp.

R. Clyde Wolfgang has been named sales manager of the Grinding Wheel Div., The Electro Refractories & Alloys Corp., Buffalo, while **Milton H. Berns** has become director of technical service.

BUSINESS ITEMS

The Superior Engine Div., The National Supply Co. has opened a southeastern regional office at 531 Gravier St., New Orleans. **R. E. Hoffman,** former manager of the division's office at Jacksonville, Fla., will be manager of the new regional office.

The National Welding & Grinding Co., Dallas, Texas, has been incorporated by **John O., M. C.,** and **E. G. Wharton.**

Auto Screw Products Co., Inc., 702 Louderman Bldg., St. Louis, Mo., has been formed to deal in all types of automatic screw machine products. **George Baumgartner, Paul Molloy, C. A. Carlson** and **M. E. Hansen** are the incorporators.

Evans Engineering Co., Waukesha, Wis., has been acquired by the **Magnolia Metal Co.,** Elizabeth, N. J.

P. A. Patterson Co., Inc., 3115 No. Broad St., Philadelphia, has been reorganized with **John C. Wilcox** as president, and **Robert J. Peel** as vice president and treasurer. **P. A. Patterson,** former head of the firm, will serve in an advisory capacity.

The Babcock & Wilcox Co., New York City, has appointed the **Portilla Corp.** as its agent in Puerto Rico and adjacent islands to represent not only the parent company, but also the Tube and Refractories Divisions.

Hewitt-Robins, Inc. has consolidated the Birmingham office of the **Robins Conveyors Div.** with that of the **Hewitt Rubber Div.** at 615 North 9th St., Birmingham, Ala.

The G & W Plating Co., 1357 Seneca Ave., New York City, has been formed by **Norman I. Ginsberg** and **John O. Walsh.** The plant is equipped to do electroplating and apply enamel and lacquer baked finishes.

The American Welding & Manufacturing Co. has moved its Cleveland district sales offices from Warren, Ohio to the Union Commerce Bldg., Cleveland.

Kennametal, Inc. has opened an office at 528 White Bldg., Buffalo, N. Y. with **Harry W. Bearfoot** serving as tool engineer and representative.

The R & L Manufacturing Co., Toledo, Ohio, manufacturers of tools for the automotive industry, was recently incorporated.

Fleet Aircraft & Manufacturing, Ltd., Ft. Erie, Ont. has incorporated a United States branch, **Fleet Manufacturing, Inc.,** at 110-112 Pearl St., Buffalo, to handle U. S. sales. **Thomas Y. Smith,** managing director of the Canadian company, is president of the U. S. firm.

Western Aircraft Tool Co., Los Angeles, has moved into its newly erected office and factory building at 2505 No. Ontario St., Burbank.

Carboloy Co., Inc., Detroit, has appointed the **Kendall Hardware-Mill Supply Co.** its distributor in the Battle Creek and Kalamazoo areas of southwestern Mich.

Alloy Rods Co., York, Pa., has appointed **The Rogers Welding Supply Co.,** 1527 Main St., Buffalo, as its distributor in that area to handle its complete line of electrodes.

The MB Manufacturing Co., Inc., New Haven, Conn., has transferred its Instrument Div. to a new and separate corporation, **MB Instruments, Inc.**

Willys-Overland Motors, Inc. has formed **Willys-Overland de Mexico, S. A.** to handle Willys-Overland sales distribution in Mexico.

SKF Industries, Inc. has purchased a plant in Hornell, N. Y. from the **F. A. Smith Manufacturing Co.,** Rochester, to provide new and larger facilities for the manufacture of anti-friction bearing pillow blocks now produced at its Philadelphia plants.

Forslung Pump & Machinery Corp., 1717 Main St., Kansas City, Mo. has been incorporated by **Oliver A. Forslung, William T. Carter** and **John E. Gardner, Jr.**

The Corlett-Turner Co. has moved to 1001 So. Kostner Ave., Chicago, following a major fire which completely destroyed the former plant.

The Reed Roller Bit Co. has acquired the plant of the **Krausse Tool and Engineering Co.** in Houston, **Texas.**

The Barens Manufacturing Co., a machine shop, has been formed at 521-23 Westport Rd., Kansas City, Mo. by **Cecil D. Barnes** and **Edward L. Granger.**

OBITUARIES

Herman W. Falk, 79, chairman of the board and founder of the Falk Corp., died Feb. 17. Mr. Falk was president until 1940 when he resigned and became chairman of the board. He was also a director and member of the executive committee of Allis-Chalmers Mfg. Co. as well as chairman of the board of the Heil Co.

William S. Armstrong, 59, executive vice president of Henry Disston & Sons, Inc., passed away Feb. 17. He joined the tool firm 39 years ago and in 1927 he became secretary-treasurer and seven years ago was named executive vice president.

George C. Scott, 71, retired president and one of the organizers of the United States Steel Export Co., New York City, died Feb. 17.

William S. Thomson, 77, chairman of the board of the Tobrin Tool Co. died Feb. 12. Mr. Thomson founded the tool company which he headed for many years.

Gustave E. Rekate, 65, manager of the Depew, N. Y. plant of the Magnus Metal Div., National Lead Co., died Feb. 4.

Charles F. Goedke, president of the Ganschow Gear Co., Chicago, passed away Feb. 20. He had served on many committees of the American Gear Manufacturers Association and was president in 1939-40.

Frederick Schroeder, for many years Ohio manager of The O.K. Tool Co., Shelton, Conn., passed away recently. He was the company's oldest employee, having joined it in 1907.

Charles E. Miser, 89, who operated the former Watertown Special Co., Watertown, N. Y. for 14 years before it was sold to the Frederick Iron & Steel Co., Frederick, Md., died Feb. 14.

Robert D. Heflin

Robert D. Heflin, 63, direct sales representative of the Gisholt Machine Co. in charge of the firm's branch office in Newark, N. J. for the past 25 years, died suddenly Jan. 23. He joined Gisholt in 1911 and was assigned to sales work in the eastern United States. He joined the Newark office when it was established and was later placed in charge of it.

Horace R. Grant, 70, former president of the Allen Manufacturing Co., Hartford, Conn., passed away Feb. 17. Mr. Grant was with Allen for 30 years, 25 as president and general manager. Following his retirement last year, he was named chairman of the board.

Lamont A. McDowell, 62, general superintendent of the Massey Harris Co. plant in Batavia, N. Y. for the past 18 months, died Feb. 13.

MEETINGS

American Management Association. Production meeting. Hotel Pennsylvania, New York, N. Y. April 14-15. Edward K. Moss, director of Public Relations, 330 W. 42 St., New York 18, N. Y.

American Society of Tool Engineers. Annual convention. Houston, Texas. March 19-22. J. M. Cannon, director of public relations, 1666 Penobscot Bldg., Detroit 26, Mich.

Society of Automotive Engineers. Spring Aeronautic meeting. Hotel New Yorker, New York, N. Y. April 9-11. Transportation meeting. Hotel Stevens, Chicago, Ill. April 16-18. John A. C. Warner, general manager, 29 W. 39 St., New York, N. Y.

Society of the Plastics Industry, Inc., National Plastics Exposition. The Coliseum. Chicago, Ill. May 6-10. Wesley S. Thurston, director of public relations, 330 W. 42 St., New New York, N. Y.

Southern Machinery & Metals Exposition. 2nd annual exposition. Municipal Auditorium, Atlanta, Ga. April 14-17. R. S. Lynch, president, Atlantic Steel Co., Atlanta, Ga.

Western Metal Congress & Exposition. Oakland Civic Auditorium, Oakland, Calif. March 22-27. W. H. Eisenman, 7301 Euclid Ave., Cleveland 3, Ohio.

32 Critical Points Checked In One Pass

One operator on each of these Sheffield Precision-aire Gaging machines checks the diameter in each of the eight cylinder bores at four critical points, and stamps the true diameter of each cylinder into the block for accurate selective assembly—all at a rate exceeding 50 blocks per hour.

These gaging machines are set in the production conveyor lines. Operators merely push buttons to position the cylinder block and the gaging spindles. The machines do the gaging, and accuracy is not affected by the human equation.

Savings exceed significant original estimates and are accomplished in comparison with other methods requiring many skilled inspectors, large floor areas and considerably more time for inspection.

[*Standard gages shipped within 24 hours.*]

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Starrett Hacksaw Booklet C describes the complete line of Starrett Hacksaw Blades for hand frame and hacksaw machine and Starrett Band Saws for cutting metal, wood and other materials. Starrett Cutting Chart instantly gives complete information for cutting any material by hacksaw or band saw. Write for copies.

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Mechanical Tubing—I

COURTESY AMERICAN IRON & STEEL INSTITUTE

Table 1—Permissible Variations in the Diameters and Wall Thicknesses of Round Cold-Finished Mechanical Tubing

Group	Size O.D., in.	Permissible Variation from: Outside Diam., in. Over	Outside Diam., in. Under	Inside Diam., in. Over	Inside Diam., in. Under	Wall Thickness, % Over	Wall Thickness, % Under
1	3/16 to 1/2 excl. (a) (b)	0.004	0				
2	1/2 to 1 1/2 excel. (a) (b) (c)	0.005	0	0	0.005	10	10
3	1 1/2 to 3 1/2 excl. (a) (b) (c)	0.010	0	0	0.010	10	10
4	3 1/2 to 5 1/2 excl. (a) (b) (c)	0.015	0	0.005	0.015	10	10
5	5 1/2 to 8 excl. (c) when wall is less than 5% of O.D.	0.030	0.030	0.035	0.035	10	10
6	5 1/2 to 8 excl. when wall is from 5% to 7.5% of O.D.	0.020	0.020	0.025	0.025	10	10
7	5 1/2 to 8 excl. (a) when wall is over 7.5% of O.D.	0.030	0	0.015	0.030	10	10
8	8 to 10 3/4 incl. (c) when wall is less than 5% of O.D.	0.045	0.045	0.050	0.050	10	10
9	8 to 10 3/4 incl. when wall is from 5% to 7.5% of O.D.	0.035	0.035	0.040	0.040	10	10
10	8 to 10 3/4 incl. (a) when wall is over 7.5% of O.D.	0.045	0	0.015	0.040	10	10

Information on permissible variations in diameter and wall thickness of mechanical tubing in several categories is to be published by the American Iron & Steel Institute in "Steel Tubular Products," which is Section 18 of the Steel Products Manual.

Mechanical tubing is welded or seamless tubing used for a variety of mechanical purposes and generally furnished on the basis of mill inspection. It may be ordered hot finished or cold finished. Carbon-steel mechanical tubing is generally available from the mills in a number of standard analyses. And (see an earlier Reference Book Sheet) tubing with a carbon content of 0.25% maximum is available from warehouse stocks in standard sizes and tolerances. Alloy-steel tubing can be produced in many compositions, but is

(Continued on page 165)

(a) For tubes with inside diameter less than 50% of outside diameter or with wall thickness more than 25% of outside diameter, or with wall thickness over 1¼ in., or weighing more than 90 lb. per ft. which cannot be successfully drawn over a mandrel, the inside diameter may vary over or under by an amount equal to 10% of the wall thickness. The wall thickness may vary 12½% over or under that specified.

(b) For tubes with inside diameter less than ½ in. (or less than ⅝ in. when the wall thickness is more than 20% of the outside diameter), which cannot be successfully drawn over a mandrel, the wall thickness may vary 15% over or under that specified and the inside diameter will be governed by the outside diameter and wall thickness variations.

(c) Tubing having a wall thickness less than 3% of the outside diameter cannot be straightened properly without a certain amount of distortion. Consequently such tubes, while having an average outside diameter and inside diameter within the tolerances shown in Table 1, will require an ovality tolerance of ½% over or under the nominal outside diameter and inside diameter, this being in addition to the tolerances indicated in the table.

EXPLANATORY NOTES

(1) The outside and inside diameters and wall thickness tolerances apply only to nominal sizes and to unannealed and finish annealed carbon and alloy steel tubing.

(2) The inside diameter tolerances contained in Table 1 have been established by use of a tapered plug gage. Where this is a critical dimension, the manufacturer should be consulted on the method of measuring and the actual dimensions of the gages to be used.

(3) Tubing having relatively heavy or light wall in relation to the outside diameter is covered by special tolerances, reference to which is made in the footnotes of the table.

(4) Unannealed and finish annealed tubing constitutes the bulk of cold finished mechanical tubing. Finish annealed is defined as tubing annealed at temperatures below the lower critical temperature just sufficiently long to reduce the stresses caused by cold finishing without markedly affecting the hardness. Tubes which have been given a softer anneal are apt to possess more or less ovality or out-of-roundness, due to warping in annealing, or to the subsequent straightening operations. The higher temperatures used in making the softer anneals, with the attendant increase in scale, also affect the accuracy of diameter. Therefore, softer annealed tubes will not be as close to size as the table indicates, but will not vary from the specified diameters by more than twice the tolerances given in Table 1. For tubes furnished heat treated by quenching in air or liquids, or processed to meet special physical properties not ordinarily obtained in unannealed or finish annealed tubing, tolerances should be subject to agreement between the manufacturer and purchaser.

(5) Tolerances are applicable only to two dimensions (length excepted). Thus, if outside diameter and wall thickness are specified, the inside diameter may not conform to published tolerances. If outside diameter and inside diameter are specified, the wall thickness may not conform to published tolerances except that the mean or average wall thickness (taking into account the permissible outside diameter and inside diameter tolerances) will not vary more than indicated under permissible variations in wall thicknesses, Table 1.

EXAMPLE

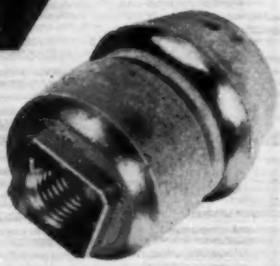
If a cold-drawn tube is specified to be 1.500 in. O.D. and 1.250 in. I.D., the theoretical wall thickness might be expected to be held to a variation of 10% over or under, or within the limits of 0.1125 to 0.1375 in.

However, a nominal O.D. of 1.500 in. may vary between 1.500 in. and 1.510 in. (average 1.505 in.) and the I.D. may vary between 1.240 in. and 1.250 in. (average 1.245 in.), resulting in an average or mean wall thickness of 0.130 in. instead of 0.125 in. Consequently the wall thickness may vary 10% over or under from the mean of 0.130 in., or within the limits of 0.117 to 0.143 in.

Therefore if the three dimensions O.D., I.D. and wall thickness are specified, it would be impracticable to meet all three of the tolerances specified for them. If, in the above case, all three of the dimensions were specified, a wall thickness tolerance of 0.1125 to 0.1375 in. would be required, which is obviously inconsistent with the actual average wall thickness resulting from standard O.D. and I.D. tolerances.

INDEXING FIXTURES

FOR HIGHER PRODUCTION



MANY parts having a multiple of duplicate machined surfaces may be surface broached to increase production thru the use of especially designed indexing fixtures. Parts need to be loaded but once. In many cases indexing is performed during one stroke of the machine. In other cases the indexing is performed at the end of each stroke and the cycle is automatic until the required number of strokes have been completed. If you have parts similar to these illustrated we will be glad to work with you on the possibility of increasing production, improving finish, or decreasing tool maintenance cost thru the use of Footburt Surface Broaching machines.

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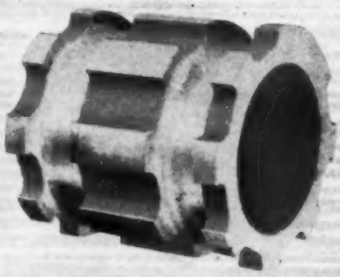


FOOTBURT PATENTED TOOTH FORM

FOOTBURT *Surface Broaching*

Mechanical Tubing—II

not stocked at tube mills, and is usually obtainable only on special order.

SPECIAL FINISHES

The five classifications of tubing described require tubes superior to the regular run of cold-drawn mechanical tubing. Class (1) offers material which, after the removal of definite maximum amounts of O.D. stock will be free of all imperfection for plating. Class (2), which is free from all surface defects, as shipped, except for light scores and pits to the extent shown in the table, may be applicable for many uses where regular cold-drawn mechanical tubing may not be of sufficiently high surface quality. Class (3), which is free from all longitudinal scores and permitting only pitting to within the limiting depths shown, should be suitable for practically all the usual applications for cylinder or piston purposes such as hydraulic jacks and air cylinders, as shipped from the mill. Class (4), furniture tubing. Class (5), polished tubing.

Class 1—Tubes for Plating with Chromium, Nickel or Similar Metals. Cold-finished tubes in general contain slight surface marks caused by heating, annealing, pickling, straightening and handling. Tubes required for plating will ordinarily be free from outside surface defects if the amount of stock shown in Table 4 has been removed. That is generally done by centerless grinding or polishing.

The composition is ordinarily carbon steel with carbon not over 0.25% Other compositions are special, and surface requirements of the tubes are subject to agreement.

Class 2—Special Smooth Outside or Inside Surface or Both. This tubing is intended for use where surface condition is of prime importance, and no stock removal by the user is contemplated. This product differs from mechanical tubing in that special processing or selection or both are necessary to obtain the required surface, except for light scars and pits within the limits shown in Table 5, and it is generally applicable for uses for which standard cold-drawn mechanical tubing would not be of sufficiently high surface quality.

The composition is ordinarily carbon steel with carbon not over 0.25%.

Class 3—Cylinder and Piston Finish. From experience it has been found

Table 2—Permissible Variations in Outside Diameters of Round Cold-Finished Mechanical Tubing with Ground Outside Surface

Size, O.D., in.	*Variations for Sizes and Lengths Given, in.*			
	Over	*Under*	*Over*	*Under*
Lengths:	*Up to 16 ft. incl.*		*Over 16 ft.*	
Up to 1¼ incl.	0.003	0.000	0.004	0.000
Over 1¼ to 2 incl.	0.005	0.000	0.006	0.000
Lengths:	*Up to 12 ft. incl.*		*Over 12 ft. to 16 ft.*	
Over 2 to 3 incl.	0.005	0.000	0.006	0.000
Over 3 to 4 incl.	0.006	0.000	0.008	0.000

Note—Wall and I.D. tolerances same as for cold-drawn mechanical tubing, Table 1. Closer tolerances than above require special consideration.

Table 3—Permissible Variations in Outside Diameters and Wall Thicknesses of Round Hot-Finished Mechanical Tubing

Group	*Specified Size, Outside Diameter, in.*	*Ratio of Wall Thickness to Outside Diameter*	*Permissible Variations from Diameter and Wall Thickness*									
			Outside Diameter in.		*Wall Thickness, %*							
					.109" and under		*Over .109" to .172" incl.*		*Over .172" to .203" incl.*		*Over .203"*	
			Over	*Under*	*Over*	*Under*	*Over*	*Under*	*Over*	*Under*	*Over*	*Under*
1	Under 3	All wall thicknesses	0.023	0.023	16.5	16.5	15	15	14	14	12.5	12.5
2	3 to 5½ excl.	All wall thicknesses	.031	.031	16.5	16.5	15	15	14	14	12.5	12.5
3	5½ to 8 excl.	All wall thicknesses	.047	.047					14	14	12.5	12.5
4	8 to 10¾ incl.	5% and over	.047	.047							12.5	12.5
5	8 to 10¾ incl.	Under 5%	.063	.063							12.5	12.5

Note 1. These tolerances apply to carbon and alloy steel tubes furnished in the "as rolled" or "soft annealed" condition. For tubes furnished heat-treated by quenching in air or liquids, tolerances should be subject to agreement between the manufacturer and purchaser.
Note 2. The recognized standard range of sizes of hot-finished tubes is 1½ in. to and including 10¾ in. outside diameter. The wall thickness may not be less than 0.095 in. (No 13 BWG) and must be 3 % or more of the outside diameter. For sizes under 1½ in. or over 10¾ in. outside diameter the permissible variations are to be agreed upon by the purchaser and the manufacturer.

Table 4—Tubes for Plating

O.D.	*Wall*	*Wall Depth Allowance for Removal of Outside Surface Imperfections Inch*
Up to 2½ in., incl.	0.065 to 0.109 in. (16 to 12 BWG), incl.	0.0015
	Over 0.109 (12 BWG) to ¼ in., incl.	0.002
Over 2½ to 5½ in., excl.	0.072 (15 BWG) to ⅛ in., incl.	0.003
	Over ⅛ to ⅜ in., incl.	0.0035
	Over ⅜ to ⅝ in., incl.	0.0045
5½ to 8 in., excl.	⅛ to ¼ in., incl.	0.006
	Over ¼ to ½ in., incl.	0.0075

Specifications for sizes not included above must generally be submitted on inquiry

IF YOU NEED STEEL...

Is this talk about steel scrap shortage "old stuff"?

Not when you hear a veteran open-hearth superintendent say this:

"We are losing ground every day. There was a bad shortage of steel scrap during the war, but now it's much worse. I'm not exaggerating when I say that steel mill scrap piles are ***now at their lowest ebb in the history of the industry.***"

There can be only one result — less steel for your needs.

(In normal times steel mills carry their highest scrap inventories from January to April.)

★ ★ ★ ★

Some steel mills have been forced to bank furnaces. Others are using abnormally high percentages of pig iron when the furnaces are "charged." This means longer refining time . . . lower production. Normally, about one-half ton of steel scrap is used for every ton of steel ingots produced.

YOU CAN HELP

There is only *one* possible solution—MORE SCRAP!

You can help hurry it to the steel industry through your regular channels by appointing an energetic supervisor to clean out the scrap "boneyards" in your plants and properties. These may include unused or obsolete equipment and machines — anything unusable that is made of iron or steel.

Then the scrap should be separated into ferrous and non-ferrous metals. A hurry call to your scrap dealer will do the rest. Help keep steel rolling! The American Rolling Mill Company, 1101 Curtis Street, Middletown, Ohio.

The shipping date may depend on <u>your</u> scrap pile!

Mechanical Tubing—III

that light pitting is not objectionable in this class of tubing, but that longitudinal scores may have a tendency to injure a cup plunger or piston. Therefore it should be entirely free of longitudinal scores on the outside, if for piston finish, and on the inside, if for cylinder finish. Light pitting to an extent not greater than shown in Table 6 is permissible as regular practice.

The composition is ordinarily carbon steel with carbon not over 0.25%. Other compositions are special.

Class 4—Furniture Tubing. Tubing of this class should have an outside surface suitable for plating without the necessity of previous polishing or buffing. The surface of the tubing should be equal to that of cold-rolled strip steel, commercial No. 2 finish.

Class 5—Polished Mechanical Tubing. (a) *Outside Surface.* Tubing under this classification is generally polished by the manufacturer to produce a finish superior to the classes indicated above. All surface defects are removed and the degree of smoothness is governed by the grade of grit used, which is subject to agreement.

NOTE—Generally the polishing is done dry, with sufficient pressure to produce heat, and should remove approximately the following amounts of stock per pass:

Grit No.	Stock Removed from Wall per Pass, in.
80	0.0015
120	0.0010
150	0.0008
180	0.0007
240	0.0005
320	0.0002

(b) *Inside Surface.* Because of the various methods employed, the polished finish of inside surfaces is generally subject to special agreement.

Standard Straightness Tolerances for Cold Finished and Hot Finished Round Mechanical Tubing. Under standard practice out-of-straightness tolerances should not exceed the amounts shown in Table 7. The tolerance for any 3 ft. of length is measured with a 3-ft. straightedge and the use of a feeler gage. The total tolerance, that is the maximum curvature at any point in the total length of the tube, is determined by rolling the tube on a surface plate and measuring the curvature with a feeler gage. The table applies to lengths not over 22 ft.

The tolerances apply generally to unannealed, finish-annealed and medium annealed cold-finished or hot-finished tubes of carbon steel up to a maximum of 0.45% carbon, and to alloy steel tubes up to a maximum of 0.25% carbon. Tubes having lighter or heavier walls, and soft annealed or hardened tubes present straightening difficulties in varying degrees beyond normal, and the tolerance requirements of those tubes should be agreed upon at the time of ordering.

Tubes for special purposes such as conveyor rolls, requiring straightness tolerances closer than above, demand special straightening operations and inspection which should also be agreed upon at the time of ordering.

Table 5—Special Smooth Finish Tubes

O.D.	Wall	Wall Depth Allowance for Surface Defects Inch	
		Scores	Pits
Up to 2½ in., incl.	0.065 to 0.109 in. (16 to 12 BWG), incl.	0.001	0.0015
	Over 0.109 (12 BWG) to ¼ in., incl.	0.001	0.002
Over 2½ to 5½ in., excl.	0.083 (14 BWG) to ⅛ in., incl.	0.0015	0.0025
	Over ⅛ to 3/16 in., incl.	0.0015	0.003
	Over 3/16 to ⅜ in., incl.	0.002	0.004
5½ to 8 in., excl.	⅛ to ¼ in., incl.	0.0025	0.005
	Over ¼ to ½ in., incl.	0.003	0.006

Specifications for sizes not included above must generally be submitted on inquiry.

Table 6—Cylinder Finish and Piston Finish

O.D.	Wall	Wall Depth Allowance for Pits Inch
Up to 2½ in., incl.	0.065 to 0.109 in. (16 to 12 BWG), incl.	0.0015
	Over 0.109 (12 BWG) to ¼ in., incl.	0.002
Over 2½ to 5½ in., excl.	0.083 (14 BWG) to ⅛ in., incl.	0.0025
	Over ⅛ to 3/16 in., incl.	0.003
	Over 3/16 to ⅜ in., incl.	0.004
5½ to 8 in., excl.	⅛ to ¼ in., incl.	0.005
	Over ¼ to ½ in., incl.	0.006

Specifications for sizes not included above must generally be submitted on inquiry.

Table 7—Round Mechanical Tubing: Permissible Variations from Exact Straightness

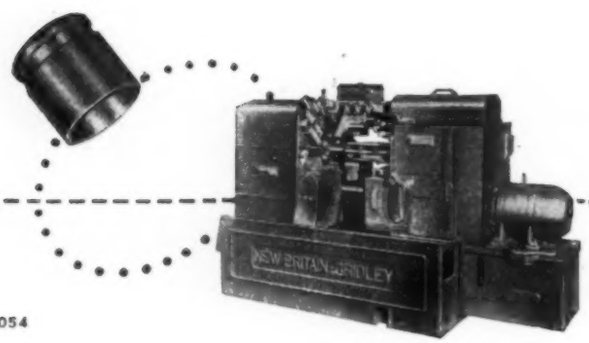
Size Limits	Max. Curvature in any 3 Feet	Maximum Curvature in Total Lengths	Maximum Curvature for Lengths under 3 Feet
O.D. 5" and smaller. Wall thickness, over 3% of O.D., but not over 0.5"	0.030"	$0.030'' \times \frac{\text{Number of feet of length}}{3}$	Ratio of 0.010" per foot
O.D. over 5" to 8", incl. Wall thickness, over 4% of O.D., but not over 0.75"	0.045"	$0.045'' \times \frac{\text{Number of feet of length}}{3}$	Ratio of 0.015" per foot
O.D. over 8" to 10¾", incl. Wall thickness, over 4% of O.D., but not over 1"	0.060"	$0.060'' \times \frac{\text{Number of feet of length}}{3}$	Ratio of 0.020" per foot

IT TAKES TWO TO SAVE FREE ENTERPRISE

FREE enterprise and not-so-free enterprise are fighting it out for the world's markets. Both sides are turning out good products and doing all in their power to tempt the world buyer. We are at a disadvantage in one respect — we don't sacrifice human standards to cut costs and lower prices. We must find some other way or lose the business.

The only other way is the way that leads to both lower costs and *higher* human living standards. It is a matter of lowering costs through more efficient production. In other words, it's up to industry to provide the American worker with the world's best machines and the world's best methods. It's up to the man at the machine to make full use of the production the maker built into that machine. Below is an example of how one manufacturer is doing this.

EXAMPLE: Not all the worthwhile examples of good machining are tricky or "difficult" parts, by any means. Illustrated is a small piston, involving nine operations, including a rotating pick-off spindle. On this job, 835 pieces are turned out per hour on the average, reducing cost per piece to an almost negligible factor in relation to the finished product in which it is employed.



M-01054

New Britain Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

Shop Equipment News

Ram Lifts with Compressed Air in Chambersburg Gravity Drop Hammer

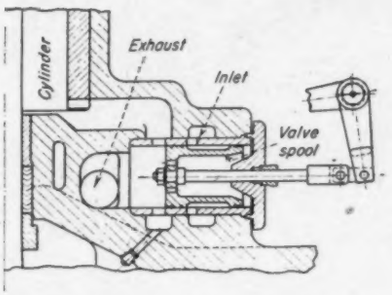
The Ceco-Drop, a gravity drop hammer in which steam or compressed air is used to lift the ram, has been developed by the Chambersburg Engineering Co., Chambersburg, Pa. The new hammer is said to deliver 10 to 20% more blows in a given time than a board drop hammer of equal size. This is accomplished by the more rapid lift of the ram.

The hammer will be built in sizes from 50 to 20,000 lb. The present limit for board drop hammers for this company is 5,000 lb.

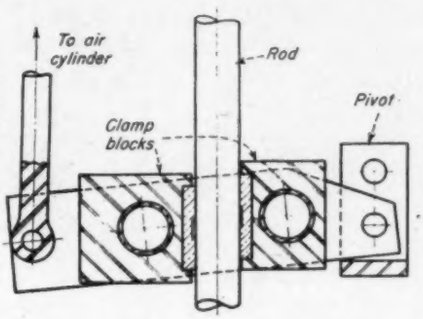
Fewer parts are required and the total weight has been reduced even though the frame is heavier. Anvils are identical with those on Chambersburg board drop hammers of recent manufacture. On the 2,000-lb. Ceco-Drop there are 22% fewer parts, the frame weighs 500 lb. more, and the total weight is 2,000 lb. less than on the same size board drop. This weight reduction is accomplished at the top of the machine, lowering the center of gravity to a point about 10 in. above the die line, approximately the same point as the center of gravity of the ram when it strikes the lower die.

Two pneumatic systems are used, one to lift the ram and one to operate the clamp. A rocker pivoted on the right-hand frame controls the spool-type valve which controls the lift of the ram. This valve operates in a horizontal position so that it is free from the influence of gravity. Dogs on the rocker, one on the lower arm and two on the upper, can be adjusted by removing locating pins, slipping the dogs to desired positions, and inserting the pins (which are held in place by internal spring locks). The height of drop can be adjusted in a minute or two.

When the ram falls it shifts the rocker as it passes the dog on the lower part of the rocker, admitting air (or steam) to the under side of the piston. As the ram nears the upper limit of travel it meets the lower dog on the upper part of the rocker, closing the valve. The ram continues to rise from expansion of the air in the cylinder until it meets the upper dog which shifts the valve to exhaust position allowing the ram to drop.



Spool-type operating valve moves in a horizontal plane. When it is in exhaust position, the ram drops



Clamp assembly pivots up when the treadle is depressed, and clamping blocks in the carriage release the rod for automatic stroke

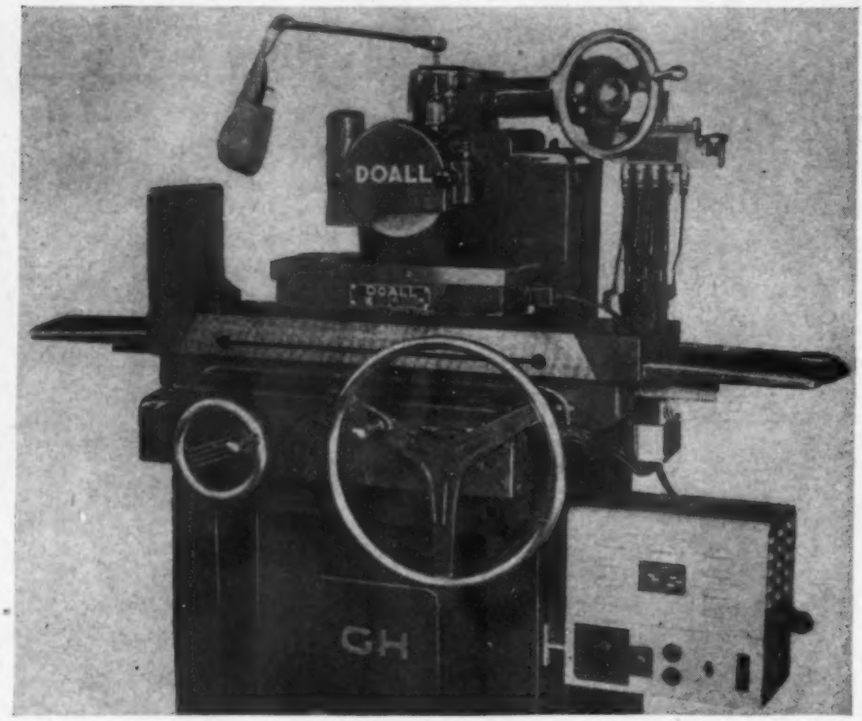
The ram is clamped in the raised position by a carriage pivoted at one end of the yoke and connecting through levers with an air cylinder at the other. Clamping blocks are pivoted on pins and have bronze clamping faces which can be replaced in a few minutes. The clamp cylinder is actuated by a pilot air valve operated by the treadle. When the Ceco-Drop is operated by steam, compressed air must be supplied for the treadle and clamp.

Power requirements are 1.6 hp. per 100 lb. of falling weight as compared with 1 hp. for the average board drop. This increased requirement is said to be offset by the increased production when operating, the reduced time required for adjustments, and the decreased maintenance costs.

A broken rod can be replaced in about a half hour, approximately the time required to replace boards in a board drop.. Rods are estimated to have an operating life of at least 200 hours.

Top side of the piston is open to the atmosphere in the Ceco-Drop, allowing gravity fall of the ram. The ram is lifted by compressed air or steam admitted to the underside of the piston

DoAll's Model GH Surface Grinder Handles Work up to 12-in. Height



Model GH Surface Grinder has deep V-ways between the saddle and base, and one V- and one flat-way between the table and saddle

The Model GH hand-operated surface grinder has been added to the line of The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. Using a standard 7- x ½- x 1¼-in. grinding wheel, the working area of the table is 6½ x 19¾ in. with a maximum work height of 12 in.

The table action is produced by a 16-in. handwheel. The elevating and crossfeed screws operate through 4-in. bronze nuts to minimize wear. The handwheel for spindle elevating Jane St., Pittsburgh, Pennsylvania. and the handwheel for crossfeed is in thousandths. Both have vernier adjustment to 0.0001 in.

The grinder has a cartridge-type direct-drive spindle with ball bearings throughout to take up for wear. A 1-hp. motor is dynamically balanced with the spindle, and both are totally enclosed. The one-piece hose and column support construction is designed to give rigidity to the grinding wheel.

Phil-Skid All-Welded Platforms Designed for Heavy-Duty Service

An all-welded steel-construction platform with a heavy corrugated steel deck is announced by the Phillips Mine and Mill Supply Co., 2227 Jane St., Pittsburgh, Pennsylvania.

The Phil-Skid is made to handle heavy castings, scrap and other industrial products. Absence of screws and bolts protects loads from tear or score.

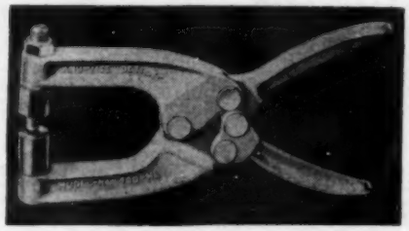
Page's Shielded-Arc Electrode Welds All Grades of Cast Iron

An electrode to produce machinable welds on cast iron has been announced by Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa. The Page Ni-Cast shielded-arc electrodes are made to bond with all grades of cast iron with a minimum of penetration and heating.

The nickel core wire has a coating free of flourides and other injurious ingredients. The welds are said to be free from porosity, hard zones of white iron and leaks.

The electrodes can be used with ac. or either polarity dc. They are manufactured in 3/32-, ⅛-, 5/32- and 3/16-in. dia.

Knu-Vise, Inc. Hole Locator Automatically Locks on Work



A hole locator operating like ordinary pliers has been announced by Knu-Vise, Inc., 16891 Hamilton Ave., Detroit, Mich. The device has a toggle action which automatically locks on the work, leaving the operator's hands free. Several metal sheets can thus be quickly aligned.

The spindle can take work up to 1¼ in. thick and uses pins in all popular diameters. The locator is 8 in. long and 3 in. wide, weighs 22 oz. It can hold a maximum of 500 lbs.

Burg Neoprene-Mounted Toolholder Used in Multiple-Spindle Tapping

A Neoprene-mounted, positive-drive, Tool-Flex toolholder, which will tap holes 15/16 in. center to center on multiple-spindle tapping operations, has been announced by Burg Tool Mfg. Co., 5028 W. Jefferson Blvd., Los Angeles 16, Cal.

The product has Acme-threaded shanks. It is composed of four parts; shank, collet, Neoprene mounting and locking ring. The floating mounting is used to compensate for misalignment and reduce top breakage.

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McCullough Co.'s Drill Jig Fits 1/16- to 1/2-in. Drills

A drill jig which will accommodate drills up to ½-in. dia. has been announced by McCullough Mfg. Co., 12709 Gratiot Ave., Detroit 5, Mich. A set of six bushings graduated from 1/16 to ⅜ in., inclusive, are furnished. For ½-in. holes the jig is used without bushings.

Jaw springing or binding is prevented by a pivoted link-and-pin construction. The jig is drilled and tapped for mounting on tables. It will hold any shape of stock up to 2-in. dia.

Progressive's Flash Welders Handle Virtually Any Metal

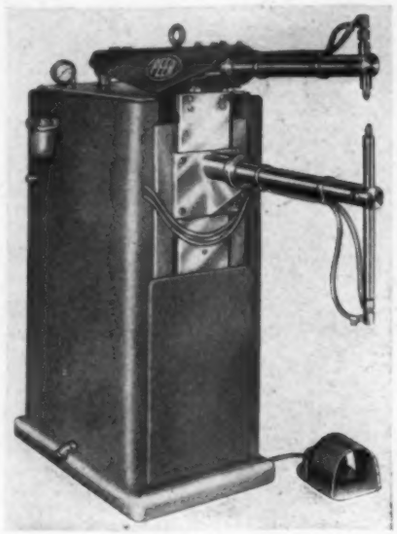
A line of improved standard-motor flash welders has been announced by Progressive Welder Co., 3050 E. Outer Dr., Detroit 12, Mich. The machines are motor-upset equipment and are designed for flash-welding almost any metal including aluminum. Capacities are from 20 to 150 kva.—or battery-operated for any jobs within the physical capacity of the machines.

The four machines in the line have upset pressures of 2,250, 4,500, 11,500 and 19,600 lb. Maximum stock width, vertical fixture, is 2, 4, 6 and 8 in. Maximum tube O.D., vertical fixture, is 1, 1¼, 1¾ and 2 in. They may be operated either ac. through transformers or dc. by using storage batteries.

All electrical and mechanical units are enclosed within the frame for cleanliness and reduced maintenance. Entire machine control is from one position.

Close coupling of the welding current gives increased welding speeds, while multi-step taps on the transformers permit 16 steps from 30 to 100% capacity.

Pier Equipment Spot Welder Is Automatic, Air Operated



A series of high-speed, automatic, air-operated, rocker-arm spot welders has been announced by Pier Equipment Mfg. Co., Benton Harbor, Mich.

The A-200 welders incorporate a double-acting air cylinder to provide high electrode pressure. The rocker-arm is mounted on ball bearings and has a light-weight welded-steel construction to minimize hammering of the electrodes.

Welder capacities are 10 and 15 kva. with throat depths of 8, 12, 18, 24 and 30 in.

Productirule's 10-in. Slide Rule Computes Productivity Percentage

A productivity and wage incentive slide rule has been developed by Productirule Co., Irvington, N. Y. The device is a 10-in. slide rule designed to calculate, among others, the following: standard hours of work produced, productivity percentage, wage incentive earnings, daywork and base-rate earnings, production units required to break even with base rate or to earn desired bonus, and standard labor costs per hundred units.

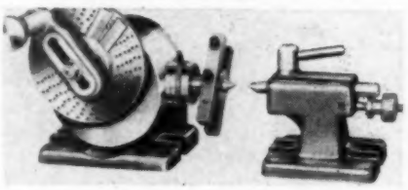
Scales are designed to include operations between 1/10 min. and 1 hr. per cycle.

Aeroquip Electronic Analyzer Will Check Hydraulic Systems

The Hydrauliscope, a device to check pressure surges and other phenomena occurring in hydraulic systems has been developed by Aeroquip Corp., Jackson, Mich.

The device is a portable high-speed electronic analyzer and is designed to give: direct static calibration, linear with pressure and constant; integral temperature compensation; response to high-frequency and high-rate pressure changes and change at low-pressure levels; negligible hysteresis; and elimination of outside effects.

L-W Chuck Co. Dividing Head For Smaller Milling Machines



A model SD 6½-in. universal dividing head has been announced by L-W Chuck Co., 25 S. St. Clair St., Toledo, Ohio. The head and tailstock are for small milling machines.

The SD has a tapered bearing and a head tilt of more than 90° in vertical position. Three index plates for up to 380 divisions are included.

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M-11, Detroit Tap and Tool Company's exclusive chrome-cobalt HSS for threading tools is now standard also for all Detroit thread plug gages. This applies to both standard and special gages.

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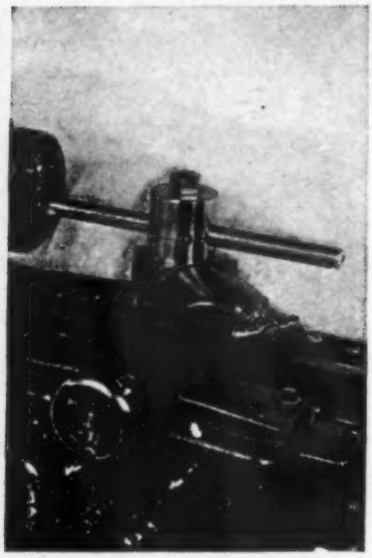
Deloss Triple Boring Set For Logan and Atlas Lathes



A triple boring set designed for Logan and Atlas lathes has been announced by Deloss Tool and Engineering Co., Royal Oak, Mich. The set includes three boring bars of ¾ x 11 in., ⅝ x 9 in., and ½ x 8 in. Each bar has a ¼ in. square hole in each end.

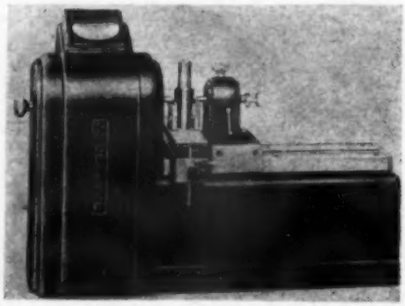
Sturgis' Roto-Finish Machines Handle Small Castings and Parts

A Roto-Finish Midget machine for grinding, deburring, polishing, honing and coloring has been announced by The Sturgis Products Co., Sturgis, Mich. The machine has a controlled rotary action and uses Midget chips and compound to do the work.

The cylinders are 8 in. wide and 12 in. across the flats. The drive is 35 to 70 rpm. Interchangeable screens for separation of chips from parts are available. A lock and adjustable clamp provide easy loading. The machine takes small stampings, machined parts and die castings.

WELDING ROD—A high-speed steel welding rod has been developed by American Manganese Steel Div., American Brake Shoe Co., Chicago Heights, Ill. Amsco Toolface is especially adapted for production of composite cutting tools where hard-surfacing and resistance to shock are required. Deposits vary with the dilution of the metal from 575 to 675 Brinell hardness. The illustration is of Toolface deposited on carbon steel and forged to shape without affecting the line of fusion

Sheffield Horizontal Comparator Uses Micrometer or Electrigage

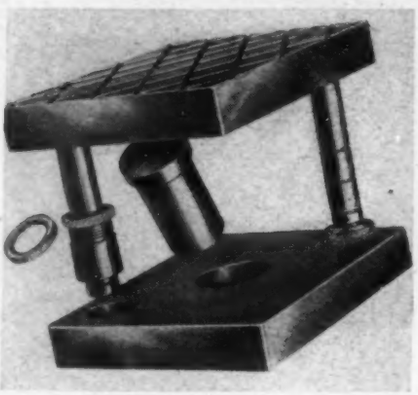


A horizontal external comparator with a capacity for measuring pieces 3½ in. high and 10½ in. long is available from Sheffield Corp., Dayton, Ohio. It will handle rectangular, threaded or cylindrical parts, tapered and straight. It is said to be accurate to millionths of an inch.

The table is available with either a standard or micrometer tailstock. It also features an adjustable pressure attachment, a removable elevating table, and a Sheffield Electrigage head available in a wide range of amplifications.

The micrometer tailstock permits readings of 0.0001 in. from the calibrated barrel without the use of gage blocks or master on work below 1 in. For full accuracy (to millionths) the tailstock is set at zero, gage blocks are used, and readings are obtained from the Electrigage. The Electrigage head gives amplifications of 100-1, 2500-1, or 5000-1. The adjustable pressure knob is calibrated from 2 to 40 oz.

Replaceable Adjustable Bushings Take Up Wear on Grunow Die Sets

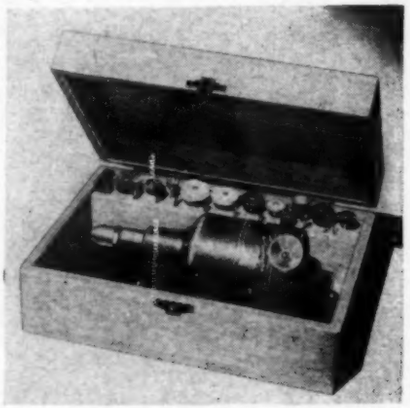


A die set with tapered guide-post bushings has been developed by A. W. Grunow Co., 563 White St, Orange, N. J. The phosphor-bronze bushings are made to turn and contract or expand by loosening a lock ring and turning an adjustment ring.

The design provides a means to compensate for lateral-thrust wear on the bushing. The ring is loosened, the bushing slightly turned, and the lock ring tightened again. The bushings can be replaced in a few minutes when completely worn.

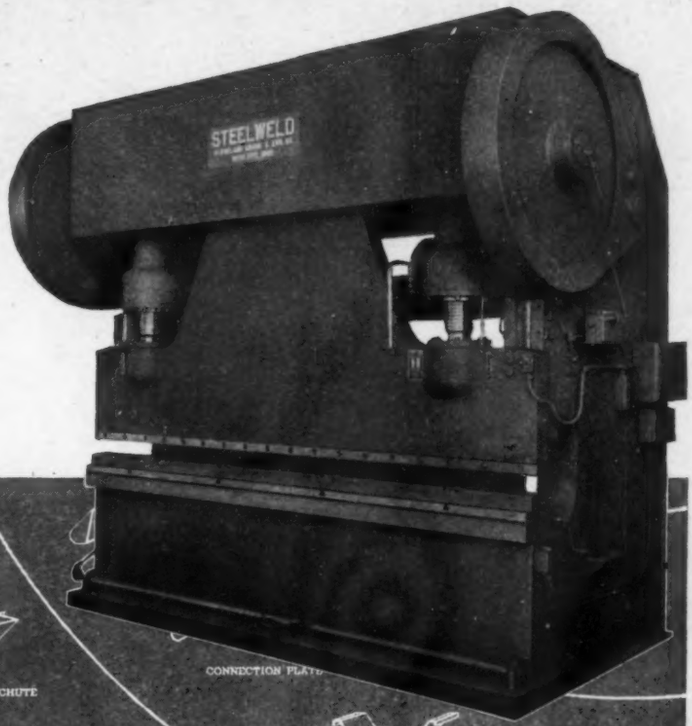
The punch holder moves easily on the guide posts, and it is said that pry bars or jacks are not needed to separate the die set.

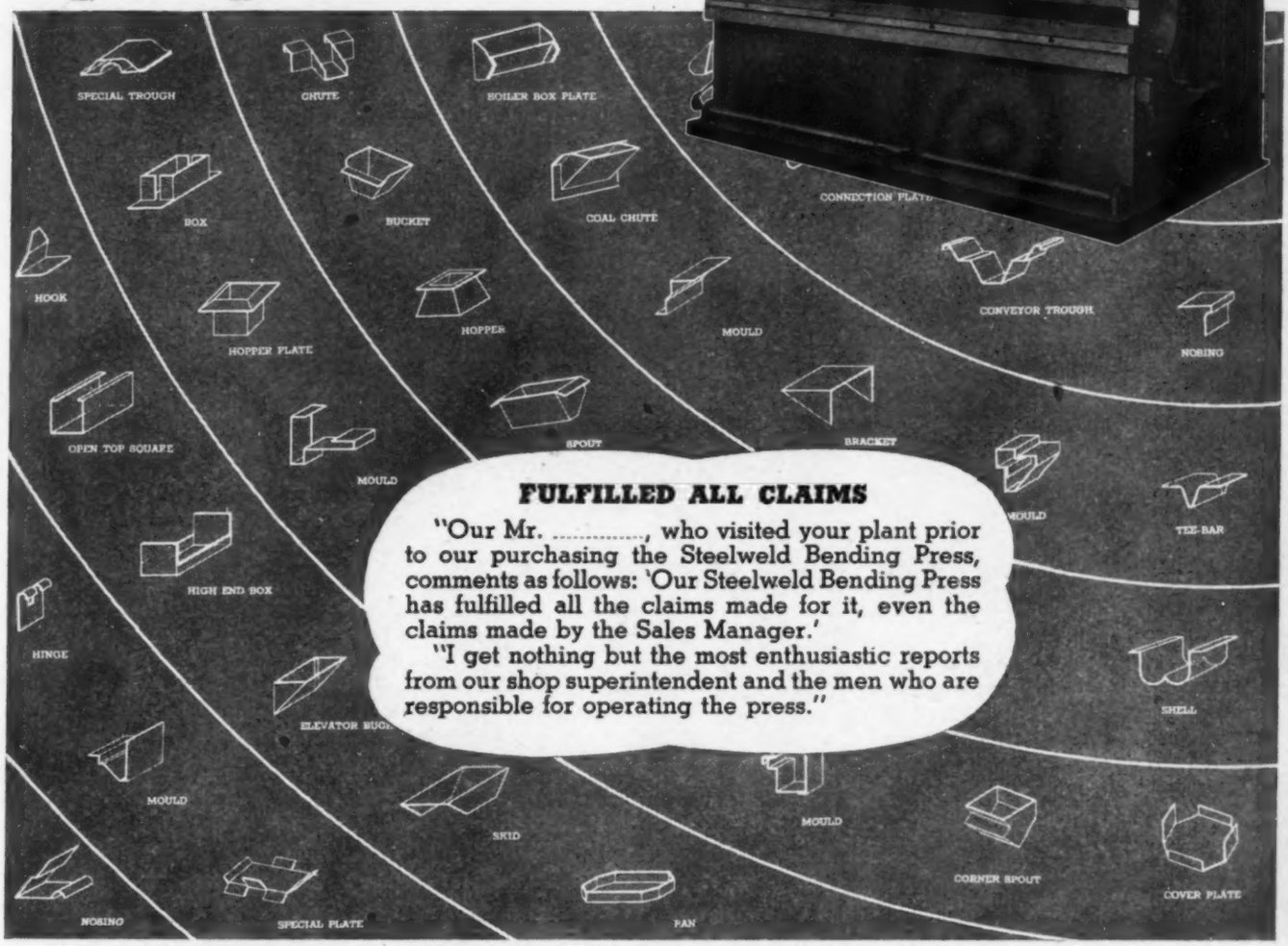
All Die Master die sets are made to order in any size.



HANDGRINDER—The Duplex electric handgrinder, which comes with an attachment to convert it to a flexible shaft tool, has been developed by The Dumore Co., Racine, Wis. The handgrinder has a 1/4-in. capacity and can be adapted to 3/32- and 1/8-in. shank tools with collet sleeves provided. It can do a variety of jobs on wood, metal and plastics including sanding, sawing and drilling. A 1/14 hp. motor is the power supply

WORDS FROM PROMINENT STEELWELD PRESS USERS





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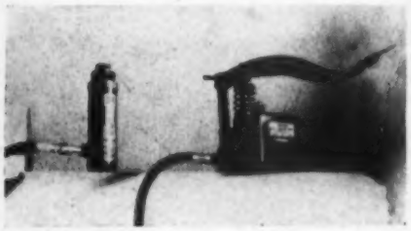
Chicago Speed-Shift Goggles Controlled by Coil Springs

A speed-shift goggle mounted on a flexible, form-fitting, plastic headgear has been announced by Chicago Eye Shield Co., 2300 Warren Blvd., Chicago 12, Ill.

Design of the goggle permits the wearer to move it in and out of position with one hand. The goggle cups are attached to the headgear and are controlled by coil springs that are mild enough to eliminate pressure and strong enough to hold the goggles in place.



HYDRAULIC UNIT—A hydraulic "Mobilepower" unit with a 7-ton capacity and a 3-in. stroke is made by Munton Mfg. Co., Franklin Park, Ill. The unit is foot operated, and weighs 45 lb. With attachments it can be used as a puller, press, lifter, spreader, "C" clamp or jack

Photoswitch's Electronic Device Times Welds from 3 to 120 Cycles

An electronic welding timer, type 30CR3, is made by Photoswitch Inc., 77 Broadway, Cambridge 42, Mass. The timer is designed for the interval timing of welding operations of 3 to 120 cycles. It is applicable to manual, air- or motor-operated welding equipment.

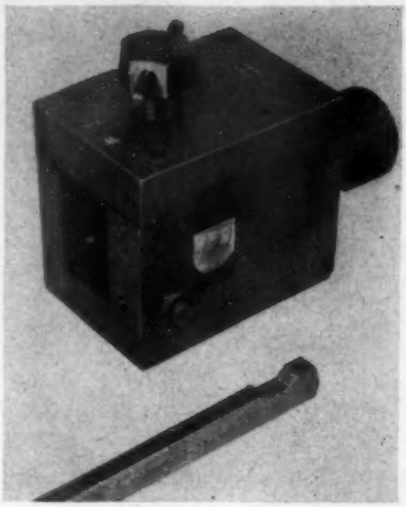
The timing adjustment is located on a panel inside the housing. The timer may be used with 115 or 230 v. ac. By selection of terminals on the terminal panel, the timer provides beat or non-beat timing (initiation of timing cycle by momentary contact or sustained contact).

The timer can also control other portions of the welding cycle when desired, such as squeeze, heat, cool and on and off periods.

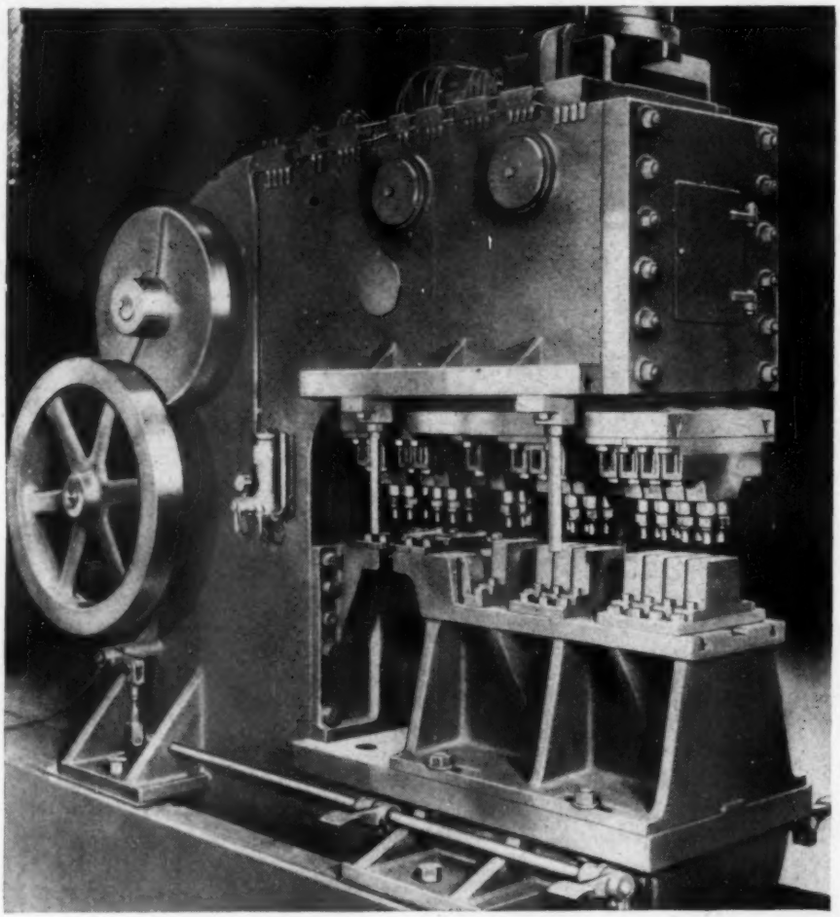
Acme Keyway Broach Pullers Lock on Notched Shank Ends

A positive-lock keyway broach puller is being made by Acme Broach Corp., E. 3rd St. at Delaware, Lexington 47, Ky. The puller is designed for keyway broaches having notch-type shanks, or broaches of any make provided they have standard notch-type pull ends.

Two sizes of broach pullers are made: No. 0 for shanks up to ¾ x ¾ in.; No. 1 for shanks up to 1½ x 1½ in. Both pullers are furnished with 2 in.-8P thread for attachment to machine.



Acme is also producing a wide variety of broaching tools of all types and sizes.



TOGGLE PUNCH—Size 12 toggle machine made by Beatty Machine & Mfg. Co., Hammond, Ind., does both flange and web punching on structural steel shapes in one handling. Punching tools have double-gag punching and die holders on each pitch line which permits punching two diameters on the same pitch line. Control levers for duplicate punching are provided. Throat depth is 25 in. Face of table is 22 x 49 in.

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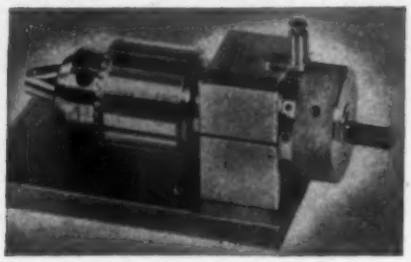
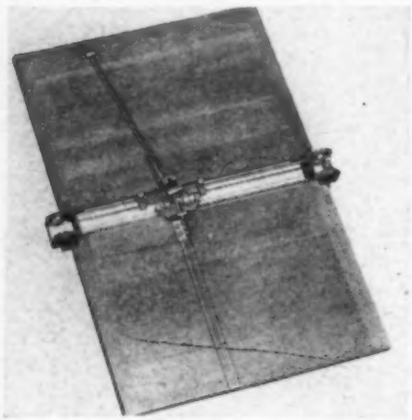
Sta-Ga-Co Grinding Attachment Grinds Bushings, Slots, Flats



The Sta-Ga-Co rotary grinding attachment is made by Star Gauge Co. and distributed by Gale Forssen Co., 64 Monmouth St., Springfield 9, Mass. The device, when attached to the magnetic chuck of a surface grinder, will grind such work as bushings, punches, radii, round and longitudinal slots, and flats.

Chuck capacity is 0 to ½ in., and the spindle has a 7/16-in. hole straight through. There are 12 divisions accurate to 4 min. on the dividing head. The attachment is said to have a grinding accuracy within 0.00005 in. of being round. Weight is approximately 10 lb.

Pomeroy Drawing Instrument Makes Stereoscopic Pairs

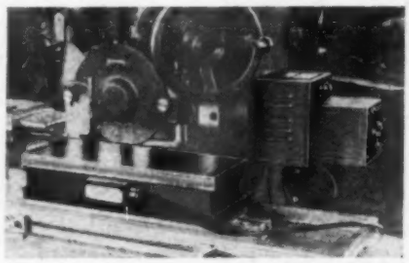


A perspective drawing instrument which can make either single perspective or stereoscopic pairs has been developed by Pomeroy Stereograph Co., Inc., 1783 E. 11th St., Cleveland 14, Ohio. The Stereograph can work from any standard line drawing or print.

Both eye views for stereoscopic pairs can be drawn by shifting the carriage approximately 2½ in. after the first perspective is made. The instrument is said to eliminate mock-ups or models. It can be used in catalogs, instruction manuals, advertising and sales.

ELECTRODE HOLDER — The Little David, a light-weight tong-type electrode holder is available from The Lacey-Webber Co., Kalamazoo, Mich. Rated at 350 amp. for rods up to ¼-in. dia., the holder is said to operate with only a 50-F. temperature rise. It is made of aluminum alloy, weighs 12 oz. and has a slip-on insulating cover used on either the top or bottom jaw. The single-leaf spring eliminates cups and coils

Hanchett's Magnetic Chucks Hold and Demagnetize Parts



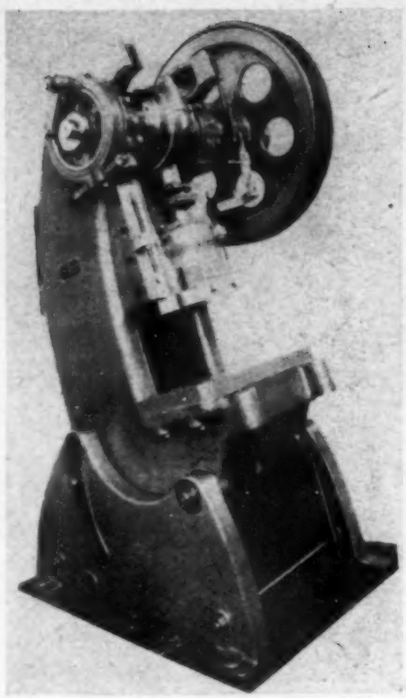
Laminated-top magnetic chucks made by Hanchett Mfg. Co., Big Rapids, Mich., are now equipped with the Neutrofier combination rectifier and demagnetizer. The chucks are laminated-top Hermati-Coil magnetic chucks, sizes 6 x 24 in. and smaller.

Snapping the control switch demagnetizes chuck and part in a few seconds. The product may be used as a holding device and also as a demagnetizer for parts magnetized from other operations.

Wegner's Inclinable Power Press Gives 80 to 90 Strokes per Min.

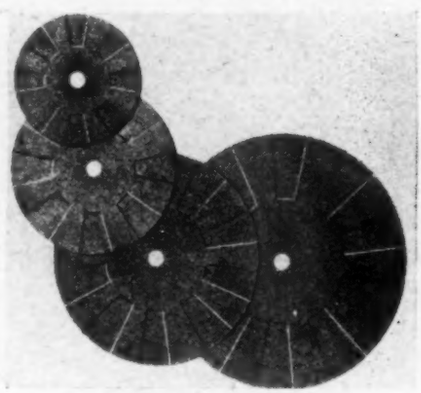
The Universal inclinable open-back power press No. 4 is built by Wegner Machinery Corp. and distributed by J. I. Bernitz, Inc., 321 Broadway, New York 7, N. Y. The inclining mechanism is actuated by ratchet and screw, and gibs for the slide can be adjusted from both sides for alignment.

Adjustable stroke length from ¾ to 4¼ in. is a feature of the machine. Operation may be non-repeat or continuous. 80 to 90 strokes per min. are available.



The press is equipped with a Rolling Key clutch with three engaging points in the flywheel. A cam-actuated brake minimizes power requirements. Weight is 4000 lb.

Ripper Abrasive Cut-Off Wheel Designed on Ripsaw Principles



An abrasive cut-off wheel designed on ripsaw principles with radial depressions 0.006 to 0.008 in. deep on the wheel sides extending from the flange area to the wheel edge has been announced by American Emery Wheel Works, Richmond Sq., Providence 1, R. I. The set of the wheel is said to provide fast cooling.

Minimum thickness of the Ripper is 1/16 in. in the 6-in. size and 3/32 in. in 8-, 10-, and 12-in. sizes. The wheels are available in different grades to cut specified materials.

HOW TO SQUARE A CIRCLE

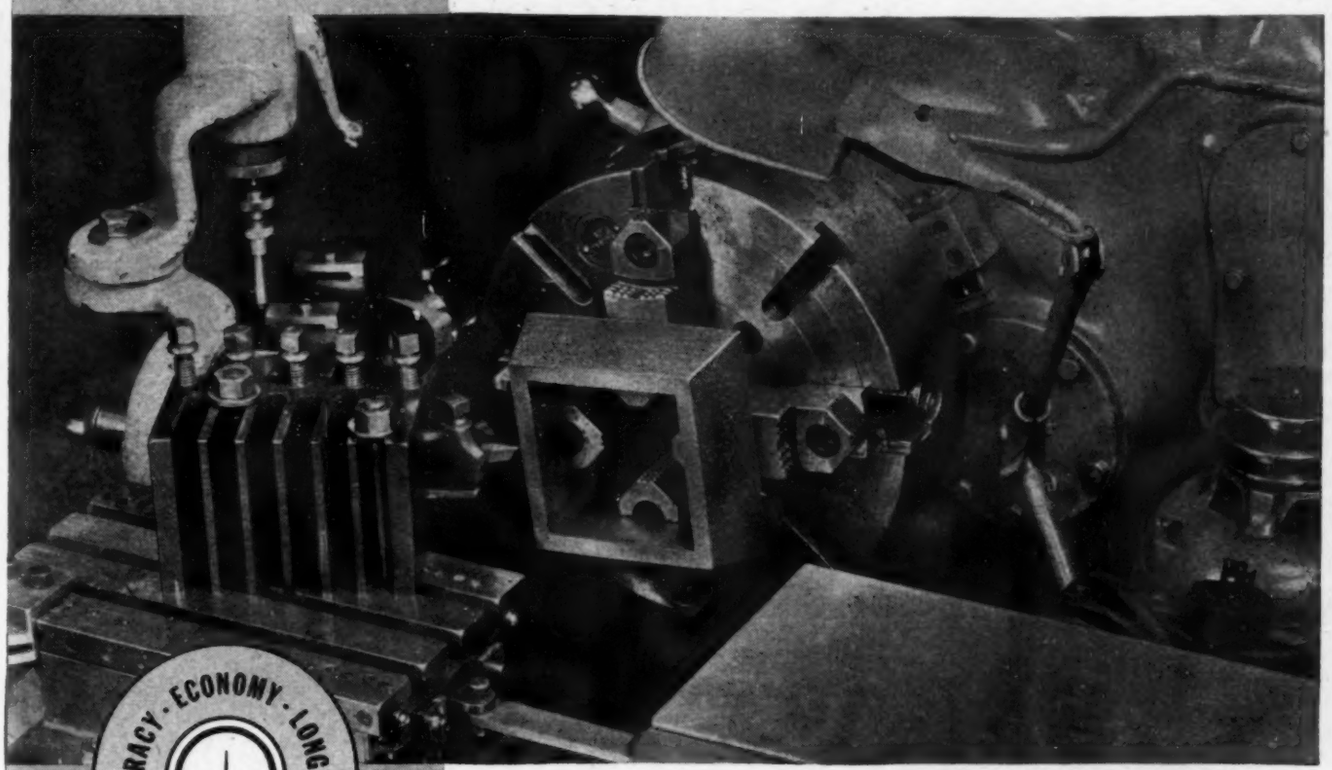
with Monarch's Shapemaster Lathe

That's right—we're actually *turning* a square—on a lathe!

But that's not all—we've bored the square, too, on a taper—and a square is only *one* of an almost infinite variety of shapes we can turn; ovals, stars, triangles, flutes (even up to *500 of 'em*, flat, convex or concave). We can blend from an oval at one end of the workpiece to a square in the middle, and back to a circle, or any other shape, at the other end. Fact is, we can turn or bore almost any conceivable contour that allows room for a tool point.

You can do it, too. All you need is the famous Monarch Shapemaster Lathe. Think what that means—intricate, costly dies *turned* on a machine, to exacting tolerances—in a fraction of the time required for handwork—and at a fraction of the cost!

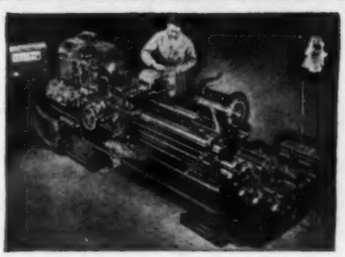
If you're doing die work—or any contour turning in metal—you owe it to yourself to investigate the Shapemaster. Like more facts? We'll be glad to oblige. Just write to The Monarch Machine Tool Company, Sidney, Ohio.



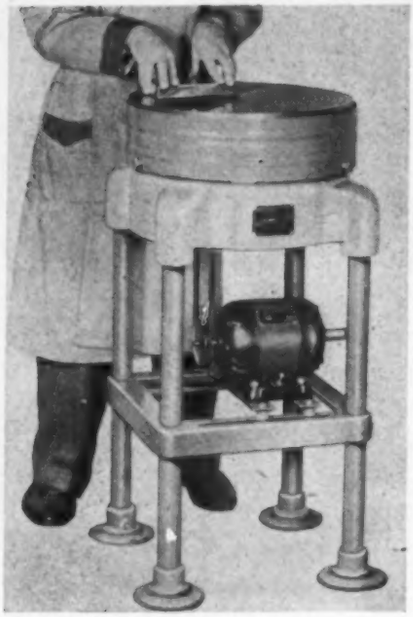
ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

For complete factual and pictorial information on how the famous Monarch Shapemaster can save you time and money in the precision production (or reproduction) of dies, write for your copy of Bulletin 2501.



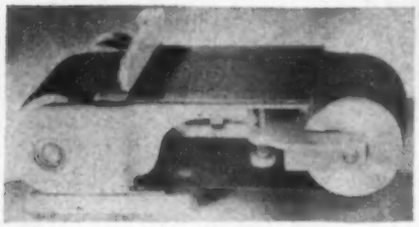
Spitfire Precision Machine Tool Performs Flat-Lapping Operations



A flat-lapping machine for large and small surfaces has been developed by Spitfire Tools, Inc., 2933 Pulaski Rd., Chicago 41, Ill. The machine handles metals, glass, quartz and other materials where flat surfaces are important. Single pieces require no holders but can be done by hand. No lubrication is necessary and only 19 x 19-in. floor space is needed.

Extra lapping plates for standard or special uses are available. There are no bolts, screws or other fastenings, so plate installation or removal is easy. It is said that a finish of 2 microinches rms. is obtainable.

Woods Model 40 Belt Sander Handles Metals and Plastics

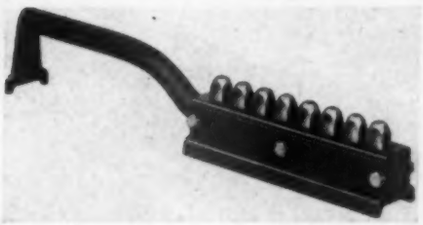


The Model 40 belt sander and tool grinder is announced by Woods Engineering Co., Norwalk, Conn. The machine handles wood, metals, plastics, glass and rubber. It can also be used for deburring and finishing small parts.

The sander weighs 17½ lb. and occupies a bench space of 9 x 15 in. The platen work area is 5 x 8½ in. Standard belts are 4 x 36 in., and the 4 x 4½-in. machined-aluminum ball-bearing pulleys are tested to 5000 rpm.

The work platen is reversible. A thumb-screw control is provided for belt tracking and tension.

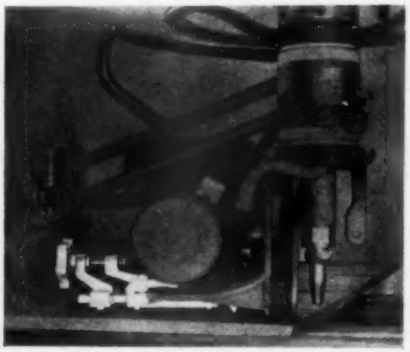
M. E. Cunningham Stamp-Holder Positions Stamps to Mark Tubing



A stamp holder in single- or double-line styles is announced by M. E. Cunningham Co., 95 E. Carson St., Pittsburgh 19, Pa. Made of one piece of alloy steel, the holder is shaped out to permit positioning of stamps on tubing and pipe as well as on flat surfaces.

"Individual Floating Style" springs fit in recesses, hold the stamps in place and keep them from flying out on recoil. As many as 14 stamps can be used in the double-line holder. Recommended sizes are ⅛ to ⅜ in. Any size character can be furnished.

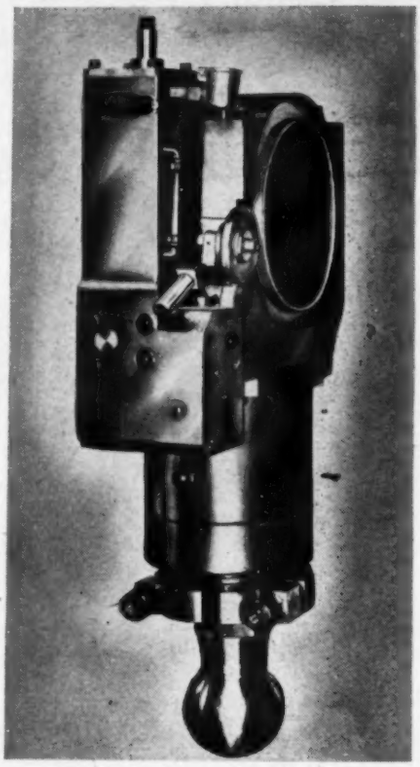
Linde Circle-Cutting Attachment Cuts to Extreme Edge of Plate



An attachment for the Oxweld CM-16 portable shape-cutting machine makes it possible to oxy-acetylene circle-cut to the edges and in corners of plates. Made by Linde Air Products Co., Unit of Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y., the Under-the-Motor Circle-Cutting Attachment utilizes metal that ordinarily is scrapped.

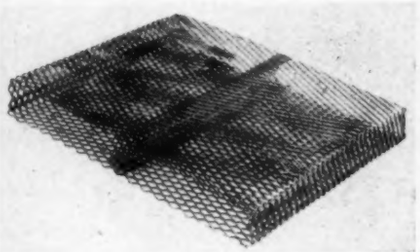
The CM-16 can cut circles of 2½- to 9-in. radius when equipped with the device. The radius is regulated by means of an adjusting screw.

Dayton Rogers Connecting Link Provides Constant Ram Pressure

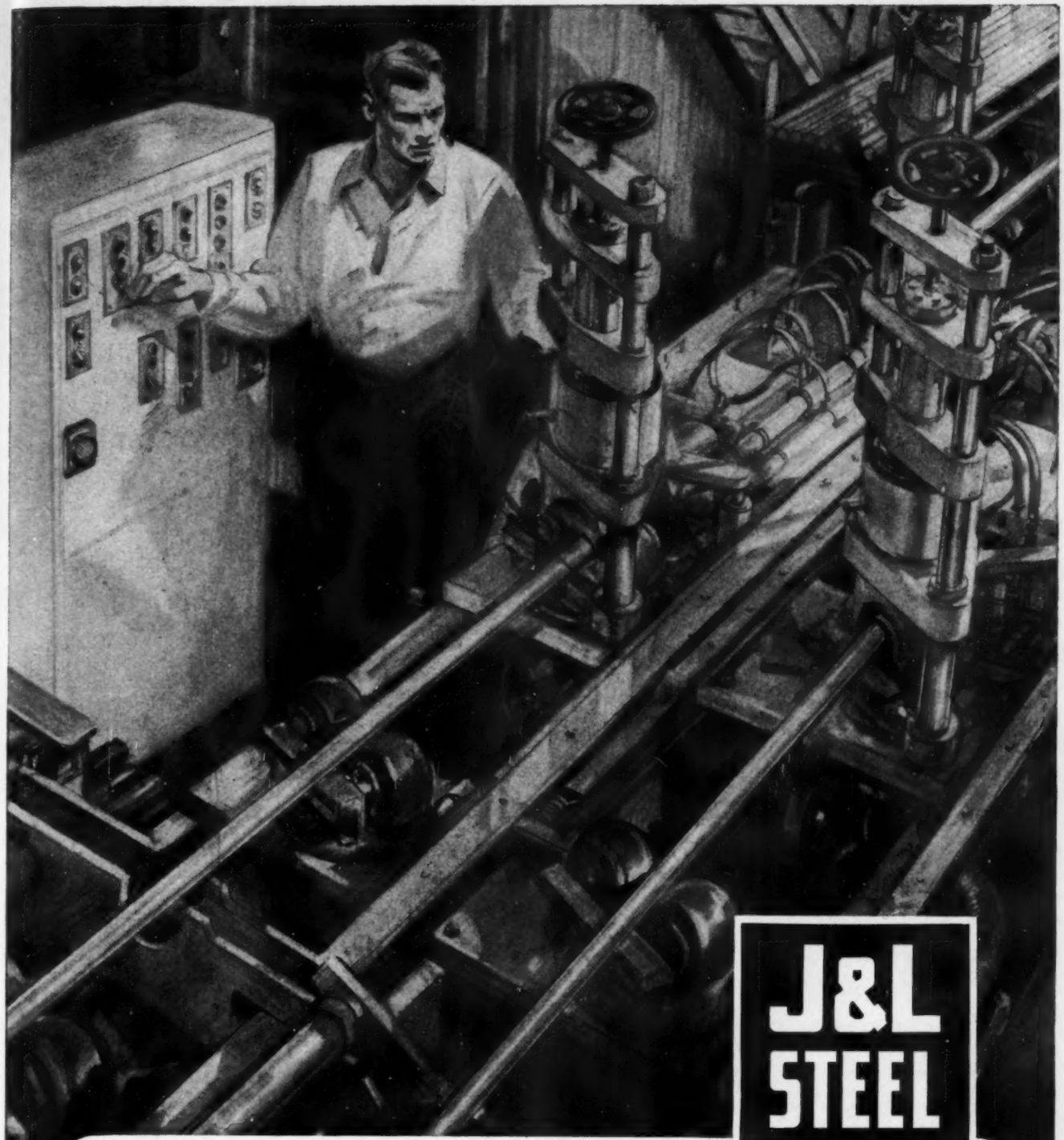


The Model HP hydraulic safety overload connecting link has been developed by Dayton Rogers Mfg. Co., 2835 12th Ave. South, Minneapolis, Minn. The product is designed to replace the conventional pitman and ram-adjusting screw on punch presses of 37- to 250-ton capacity.

The HP is constructed to give necessary tonnage protection within the maximum capacity of the press. It can compensate for stock thickness variation and is said to provide a constant ram pressure at point of operation.



PALLET—Expanded-metal pallet constructed of 13 gage material with 1/2-in. openings has been designed by Phillips Mine & Mill Supply Co., 95 Jane St., Pittsburgh 3, Pa. The pallet takes loads up to 3000 lb. and has sufficient surface friction to prevent slipping. Also available is a wood-deck steel-bound Phil-Pallet



J&L STEEL

NOW—Even Greater Uniformity with J&L "Electreat" Cold Finished Steel

You can now gain the additional advantage of increased uniformity in your bar stock by using J&L "Electreat" Cold Finished steel. In this new electric induction heat treatment process each bar is heated and quenched individually in exactly the same length of time as other bars in the lot. This makes possible greater uniformity than is provided by conventionally heat treated bars. In addition, "Electreat" bars retain their sectional accuracy and quality surface. Induction heating also keeps to a minimum decarburization of the bar.

A variety of sizes of "Electreat" Cold Finished bars are available in a wide range of quenched and tempered treatments. Write to address below for full information on how "Electreat" bars can be applied in your operations.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PA.

Parts and Materials

Square D Electronic Contactors For High-Speed Resistance Welds

A line of electronic contactors using ignitron tubes has been developed by Square D Co., Industrial Controller Div., 4041 N. Richards St., Milwaukee 12, Wis. The Class 8990 contactors are designed for resistance welding jobs involving high-speed operation or heavy primary currents of short duration.

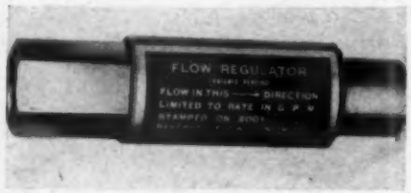
Power connections are made near the center of the enclosure, providing increased wiring space and minimum bending of the power cables. All control elements are grouped away from the tubes and cables.

The contactors are made to supplement the Syncro-Break and High-Speed magnetic contactors which are used when a wide range of weld times and duty cycles is required.

Quaker's Cutting Oil Base Blends with Mineral Oils

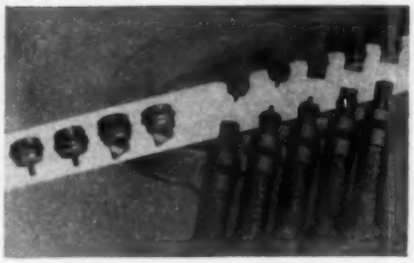
A transparent, odorless cutting-oil base has been developed by Quaker Chemical Corp., Conshohocken, Pa. The base is for use in applications that generally require fat and sulfurized-fat types of cutting-oil bases.

Quaker Kut 85 can be blended with mineral oils to handle jobs requiring cutting oils. It can be blended with 100 or 200 viscosity oil or kerosense in bulk storage tanks, oil reclamation tanks or in the machine. No new equipment is needed.



FLOW REGULATOR — An automatic flow regulator for hydraulic systems is made by Waterman Engineering Co., 721 Custer Ave., Evanston, Ill. The regulator provides unlimited flow in one direction with a predetermined rate of flow in the opposite direction. This provides machine tools with insurance against sudden release of hydraulic pressure

McNaghten & Newell Adapters Used on Micrometer Calipers



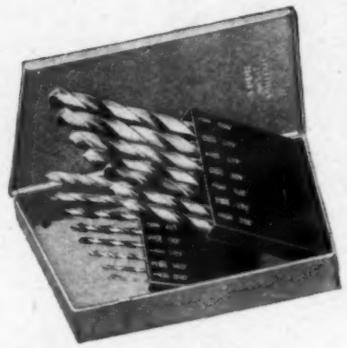
A set of four adapters for micrometer calipers has been announced by McNaghten & Newell, 8654 Melrose Ave., Hollywood 46, Calif. The M & N adapters are for the checking of recesses.

The buttons fit any size micrometer and can reduce either anvil or spindle or both to approximately one-eighth size. The adapters can be made in sizes to fit 0.235, 0.250 or 0.270 size spindles and anvils.

All-State's Aluminum Solder Fills, Repairs for Tightness

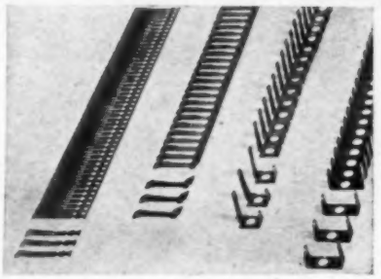
A lower-temperature rub-on solder for aluminum work has been developed by All-State Welding Alloys Co., Inc., 96 W. Post Rd., White Plains, N. Y. The solder is applied without flux.

The No. 39 aluminum solder rod has applications in filling and soldering where tightness is essential and strength unimportant: for repair of blowholes; for building up worn surfaces on aluminum castings; for repairing cracks in cylinder heads; for making changes on foundry patterns.



DRILL CASE—A metal case for drills from 1/16 to 1/2 in. is announced by Huot Mfg. Co., 128 E. 10th St., St. Paul, Minn. Graduated on the basis of 1/32 in., the case is for users who want to skip the in-between sizes. Other cases are graduated 1/64 in.

Springs in Continuous Lengths Save Assembly and Handling Time



A continuous-strip production method for saving in assembly and handling time of springs and small stampings has been developed by Instrument Specialties Co., Inc., Little Falls, N. J. Individual small springs of beryllium copper are joined in easy-to-handle lengths by sections partially sheared through.

Attachment is strong enough to keep lengths intact during manufacture and handling, but individual pieces easily snap off for assembly. The method makes possible automatic feeding in riveting operations.

In the motor laminations operation, metal stamped was .025" silicon rotor steel with highly-abrasive properties—a rugged test for any punch and die set.

40 cookies to 1

Amazing results on stamping motor laminations show Carboloy Cemented Carbide sheet metal dies produce 1,500,000 to 2,000,000 pieces (or cookies) per grind compared with 50,000 pieces for steel dies.

But that's only part of the story. Anticipated die life of Carboloy* punch and die sets is from 40 to 50 million pieces!

In other words, Carboloy* dies are way ahead, 40 to 1! Translate this into production costs, and see how you can be ahead just as much.

Other Big Advantages

In many fields, present users report closer tolerances—fewer rejects—lower cost per piece—minimum burr—big increases in output per press.

Send today for free booklet D-120, packed with ideas on results you can get.

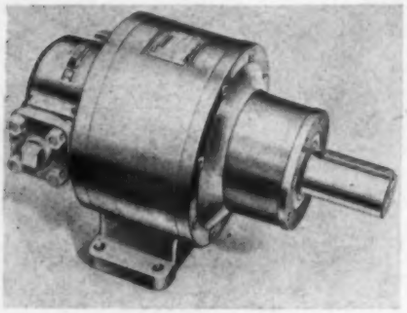
CARBOLOY COMPANY, INC.

11149 E. 8 Mile St., Detroit 32, Mich.

* CARBOLOY (TRADEMARK) CEMENTED CARBIDE

SHEET METAL DRAWING AND BLANKING DIES

Small Size Superdraulic Pump Develops Pressure of 5000 psi.

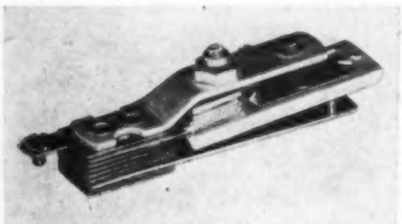


A hydraulic pump with a 6-in. dia., 11 in. long and weighing approximately 35 lbs. has been announced by Superdraulic Corp., Miller at Ford Rd., Dearborn, Mich. The pump develops 5000 psi, and has a capacity for 3 gpm. at 1800 rpm. and 2 gpm. at 1200 rpm. It has a single bank of plungers.

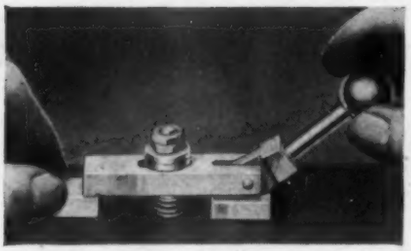
The Superdraulic Junior is designed for applications where space is at a premium and is especially applicable as a holding pump to presses and to plastics injection-molding machines. It can also be used as a reversible hydraulic motor.

Lake Chemical Soldering Flux Is Supplied in Stick Form

A soldering-flux stick is available from Lake Chemical Co., 607 N. Western Ave., Chicago 12, Ill. The Flux-Stik can be applied to hot or cold metal, but, because of non-running properties, it will cover only the immediate vicinity of the soldering joint and not spread all over the metal. It is non-acid.



CUT-OUT SWITCH—Snap-action thermal cut-out switch manufactured by George Ulanet Co., 413-415 Market St., Newark 5, N. J., will cut off a machine at a predetermined temperature and remain inoperative until reset. The Ula-Snap operates at temperature ranges of 0-150, 0-300 and 0-700 F. Over-all size is 1 x 1 x 3½ in. It has two mounting holes with 5/16-in. centers



MIDGET FIXTURE CLAMPS—A series of small fixture clamps is manufactured by West Point Mfg. Co., 19625 Merriman Court, Farmington, Mich. The Wespo Midget series consists of four styles, including quick-action clamps, for holding small work pieces. The strap is 2½ x ⅝ x ⅜ in. The clamps are made of heat-treated, cadmium-plated steel and are in exact proportion to larger clamps

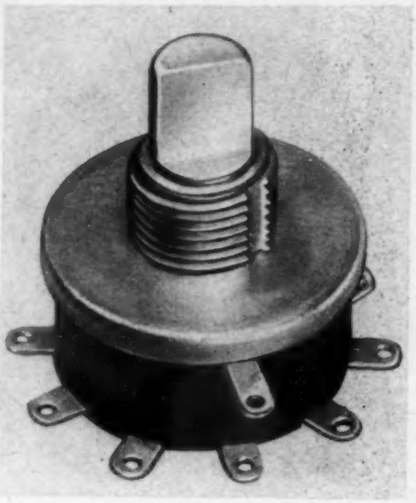
GE's Vertical Induction Motor Drives Various Industrial Pumps

A hollow-shaft vertical motor for pump drives has been announced by Apparatus Dept., General Electric Co., Schenectady, N. Y. A Tri-Clad induction motor, it is available in ratings from 1 to 500 hp., all speeds and frequencies.

A controlled lubrication system designed to prevent oil-friction loss in the bearings is featured on 10-hp., 1800-rpm. motors and larger. Motors of 7½ hp. at 1800 rpm. and smaller have grease-lubricated bearings.

A cooling system draws in air at both ends and discharges it through holes in the stator frame. Bearings are protected from rust because oil is maintained at a level above the top of the balls.

Grayhill's Miniature Switch Breaks Up to 1 amp. at 110 v.



The Series 5000 Roto Switch has been announced by Grayhill, 1 N. Pulaski Rd., Chicago 24, Ill. A miniature switch, the product is of ¾-in. dia. and 13/32-in. depth. It has a contact pressure of 2½ lb.

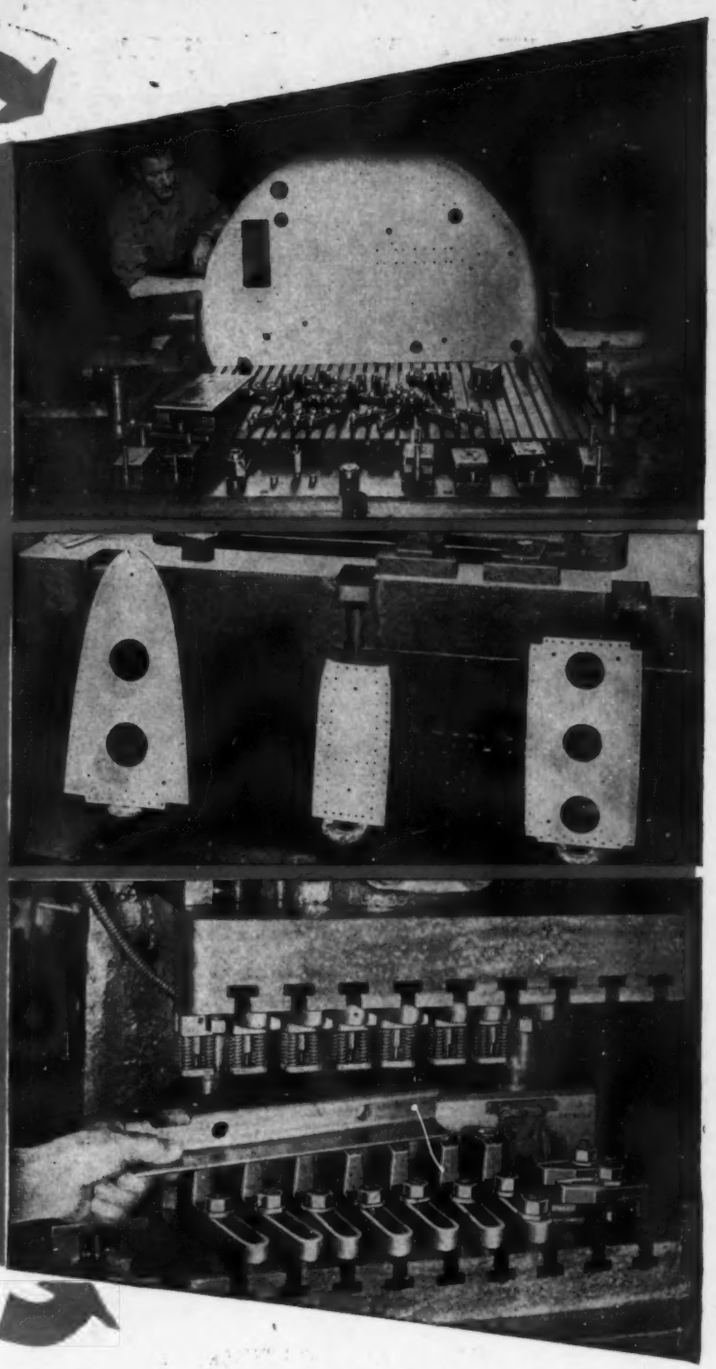
With ten positions, the switch can be rotated 360° either clockwise or counterclockwise. It can be used in circuit combinations, up to 5 amp., breaking up to 1 amp. at 110 v.

Ideal's Hot-Blade Wire Stripper Removes 3/8-in. Dia. Insulation

A Hot-Blade wire stripper has been announced by Ideal Industries, Inc., 1057 Park Ave., Sycamore, Ill. Designed for continuous production, the unit uses two electrically heated blades to strip cotton, silk, plastic or rubber covering up to ⅜ in. from stranded or solid conductors.

Stripping is effected by inserting wire between the blades, pressing the pedal to activate the blades and cut parallel grooves in the insulation, twisting the wire to complete the groove, and pulling the wire out to remove the insulation. Strippings fall in a water drawer, and a built-in exhaust draws fumes away from the blades.

Some examples of what can be done with Whistler Adjustable Dies. Work in practically any type press.



Re-use same WHISTLER ADJUSTABLE DIES in unlimited combinations

1 To Pierce Holes of any diameter from 1/32" up.

2 To Perforate Special Shapes.

3 To Notch Corners.

Save production time and reduce product costs by having Whistler punch and die units in your tool room.

Whistler notching dies, group dies and standard units are especially adaptable to combined use in the same set-up. Continued re-use in a variety of arrangements quickly writes off original investment. Reason enough for their expanding popularity with hundreds of America's best known manufacturers.

Now available from stock in a range of diameters up to 3", shipment can be made the same day your order is received. Special sizes, shapes, notching and group dies are made to order in a few days.

You get production economy plus precision perforating in practically any press with these Whistler dies. Set-ups are easy and fast. No special tools required. Heavy duty series easily pierces 1/4" steel. All parts interchangeable. Tolerances maintained to .0002". There are many other advantages. Get in touch with Whistler.

WRITE FOR YOUR WHISTLER CATALOGS. Know the production advantages of Whistler Adjustable Dies.

S. B. WHISTLER & SONS, INC.
752-756 MILITARY ROAD BUFFALO 17, NEW YORK

Need Skilled Labor?

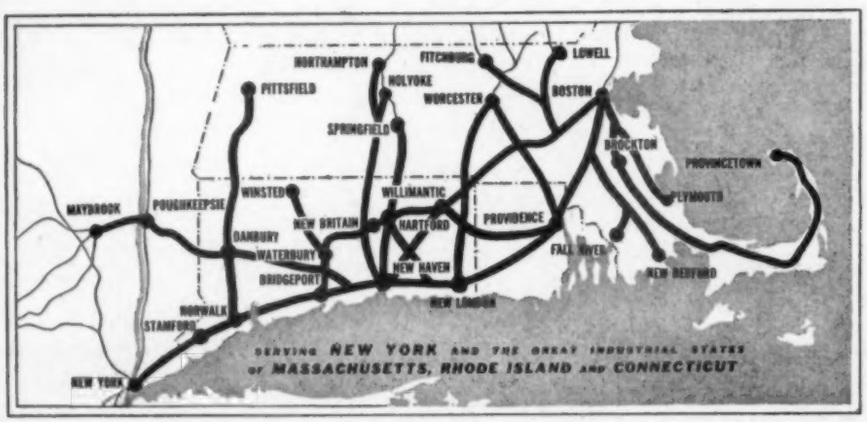
1,743,826 skilled workers live and work in Southern New England.

If your business requires skilled labor, here is a fact worth remembering: 10% of all industrial workers in the U. S. live in Southern New England . . . more skilled workers per thousand population than any other part of the country!

The availability of skilled labor is only one of the many advantages of locating your plant in Southern New England.

For a complete, concise resume of *all* the advantages that New England has to offer, write for the new, 32-page illustrated booklet, SOUTHERN NEW ENGLAND FOR TOMORROW'S INDUSTRY. Address: P. E. Benjamin, Mgr., Industrial Development, New Haven R. R., Room 201, 80 Federal Street, Boston 10, Mass.

THE **NEW HAVEN** R. R.



TO THE EDITOR

SELF-PRESERVATION

In the restless state of the world today, this nation, if defenseless, is likely to be attacked with suddenness and violence. Our industrial installations would be the object, so we might be prostrated and therefore be defeated.

I suggest a civilian association for self-preservation against aggression, consisting of approximately twenty-five persons representing all basic industries as a governing body, with panels of citizens in major industrial areas selected by invitation of the governing body. The members of such panels would be the heads of companies who could be contractors for production of all the things necessary in defense. In order that such preparation can be timely and continuous, and co-ordinated with the various departments of government, there should be assigned to each of the panels competent personnel from the Air Corps, Maritime Commission, Navy and War Departments.

An excellent article on this phase, entitled "Peacetime Liaison," by Alfred P. Sloan, Jr., has been published recently.

An immediate step would be to put into storage a large number of the pieces of production equipment out of the WAA surplus. Several methods could be recommended. However, the ideal would be:

(a) Selection and tagging of machines for the production of established items so a complete set of equipment for production, maintenance and toolmaking would be available.

(b) Storing such equipment by allocation of these machines to be set up in pilot lines in plants of selected industries dispersed over four areas of the country. When a change in the design of the article to be manufactured is made, a small production contract could be placed with each contractor, which would justify the expense of piping and wiring machines, with the removal of machines no longer required, and the substitution of ones required by the change in the design. While it is not practical to do this in all instances, it would appear that there might be sufficient unutilized space available which would form the lowest cost method of storing and preserving the equipment over a period of years.

Industry should have a selfish interest in self-preservation as a defense against totalitarianism, which

Why NICKEL Alloy Steels Are Specified for Giant Generator Shafts

Alloy steel containing two and a half percent Nickel along with small percentages of other alloying elements give the heavy sections of this turbine rotor shaft the strength, toughness and endurance so vital to dependable performance. A yield strength of 80,000 p.s.i. combined with reduction of area consistently exceeding 36% in both radial and transverse directions was achieved in this heavy section.

PHOTO COURTESY OF GENERAL ELECTRIC CO.

HEADED FOR THE LARGEST TURBO-GENERATOR OF ITS TYPE IN THE WORLD

This 75,000 pound Nickel alloy steel rotor shaft will serve in a new record size turbine generator rated at 100,000 KW, 77 feet long, 17 feet wide and designed for inlet conditions of 1250 p.s.i. and 1000° F.

INCO Nickel

TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the selection, fabrication, treatment and performance of engineering steels, stainless steels, cast irons, brasses, bronzes and other alloys containing Nickel. This information and data are yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

sheave cutters

For

PRODUCTION GROOVING AND THREAD CUTTING

WENDT-SONIS CARBIDE TOOLS

threading tools

Now! Grooving and thread cutting operations can be done faster, more economically with Wendt-Sonis Carbide Tools. Each tool is especially designed for its job. Available from stock in a wide range of sizes and grades. Shanks scientifically hardened. Cutting angles are based on exhaustive tests made under actual production conditions. Use Wendt-Sonis Carbide Tools to increase your production — help combat rising costs. Get complete details by writing WENDT-SONIS COMPANY, Hannibal, Missouri or 580 North Prairie Avenue, Hawthorne, California.

WENDT SONIS

CARBIDE TIPPED CUTTING TOOLS

BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS • CUT-OFF TOOLS • DRILLS • END MILLS • FLY CUTTERS • TOOL BITS • MILLING CUTTERS • REAMERS • ROLLER TURNING TOOLS • SPECIAL BITS

probably would follow a state of unpreparedness and from which recovery of private free enterprise would be difficult.

(c) The present small return to the Treasury (on the reduced price schedules recently announced) indicating that ultimately it will reach a point of disposal at scrap values, would be a small insurance premium compared to the reproduction cost, providing that we were not desolated through our impotence before they could be replaced in time to have a military value.

N. P. Lloyd
Lloyd & Arms
Philadelphia, Pa.

•

LETTER TO LABOR

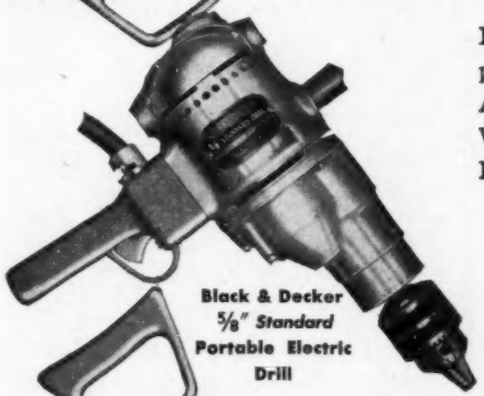
Dear Fellow-workers:

The other day while several of us were talking in a Pullman smoking compartment, a fellow said something that made me fighting mad at first, then it set me to thinking. I'm writing this letter because it concerns you as well as me. He brought up the old wheeze about salesmen being parasites who don't produce anything themselves, but live off the sweat of other people. I might have answered him with my fists—I'm in good condition, and he didn't look too husky—but that wouldn't have settled the argument. So I calmed down a little and faced up to the question, "Where does a salesman fit into the picture?"

I had been over this ground in a salesmanship training course I took before the War, but a lot of questions seem to be coming up again, and sometimes with a different angle. I told this chap that I'm not selling machines or gadgets: I'm selling *labor*. In other words, I'm YOUR business agent. If it wasn't for the work you fellows put in on it, the highest-priced machine on my list would be nothing but a small pile of scrap metal. To make it operate smoothly and stand up under hard service, some one has to make good castings for the parts, some one else has to grind them to fit, then they are inspected, assembled and tested by others before being crated for shipment. Of course I tell my customers that I am selling them the *service* that the machines will perform—hundreds of hours of efficient, trouble-free operation — but I couldn't say that if I didn't know about the man-hours of skilled, conscientious work that you have put into making the kind of machines that you are proud to build and that I am proud to sell. I am not forgetting that our firm has competitors

Plenty of Jobs Where Black & Decker Standard Drills Fill the Bill! . . . .

Black & Decker
1/2" *Standard*
Portable Electric Drill



Black & Decker
5/8" *Standard*
Portable Electric
Drill

Black & Decker
3/4" *Standard*
Portable Electric Drill

Ideal for Intermittent Service in Maintenance, Repair, Construction

You always get the *right* drill for the *right* job from the big Black & Decker Drill line. Take Black & Decker *Standard* Drills, for example. They're specifically designed for the *intermittent* drilling you do on maintenance, repair and construction jobs. Jobs where a heavy-duty model, built for *continuous* production work, would be just *too much* drill.

Made in many sizes, Black & Decker *Standard* Drills have plenty of power for driving twist drills, wood augers and B & D Hole Saws. Ask your nearby Black & Decker Distributor for complete details. Write for our complete catalog to: The Black & Decker Mfg. Co., 616 Pennsylvania Ave., Towson 4, Md.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker
PORTABLE ELECTRIC TOOLS

Here's why it pays to *Standardize* on Black & Decker Drills

When you standardize on Black & Decker Drills, you get a wide choice of models from 1/4" to 1 1/4"—each drill designed to cut costs and speed up output within its working capacity. You have convenient interchangeability of parts. You enjoy the facilities of 26 Black & Decker Factory Branches, offering quick service on replacement parts and repairs. You benefit from close-at-hand Black & Decker Distributors who offer expert help on all your tooling problems.

The SENSATION of the Material Handling Show

PUL-PAC IN POSITION TO TAKE LOAD

1

2 GRIPPER JAWS TAKE HOLD OF BOARD

3 PULLING THE LOAD ONTO CARRIER PLATE

4 LOAD IN POSITION FOR TRANSPORTING

5 LOAD IN FREIGHT CAR FOR SHIPMENT

CLARK

"PUL-PAC"--for handling unit loads assembled on an inexpensive load base of paper, fibreboard or other material... in place of Pallets.

- ✓ increases storage space
- ✓ eliminates cost and return of pallets
- ✓ reduces freight costs
- ✓ original load base handles assembled units through entire cycle from point of origin to point of use.
- ✓ write for full details

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Division of CLARK EQUIPMENT COMPANY

BATTLE CREEK, MICHIGAN

OTHER PLANTS — BUCHANAN, JACKSON, BERRIEN SPRINGS, MICHIGAN

Other CLARK Products

FORK LIFT TRUCKS		ELECTRIC STEEL CASTINGS
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RAILWAY TRUCKS		AXLES & HOUSINGS
		TRANSMISSIONS

Prices on CLARK products will not be advanced in excess of increased costs.

—and they are on their toes, too—but as long as you put your best work into our product, I'm not afraid of competition.

When we get down to brass tacks, your job and mine depends on ORDERS. Not skimming the cream during a sellers' market, but building up confidence and good will over a long period of square dealing. Right now there is a backlog of demand, and I could easily sell more machines than we produce, but that situation is changing rapidly. We have to look forward to a time when our biggest problem will be to maintain an annual sales quota large enough to insure steady, year-round employment for our whole working force.

In the long run, it is the customers who will determine whether you and I will keep our jobs and stay in business. There are many kinds of strikes—entirely too many just now—but the worst kind of all is a buyers' strike. Such matters as overtime, jurisdiction, wages and working conditions can have no meaning in a factory that has folded up and gone out of existence. We all have a stake in keeping our plant on the map as a going concern. The question of fair profits comes in here, too, for there is such a thing as a living wage for capital. No matter what department we are connected with, it is a case of all for one and one for all. As your Field Representative, I pledge you my best efforts to sell your labor in 1947.

Sincerely,

JAMES RILEY,
Salesman.

ROUND TABLE *Discussion*

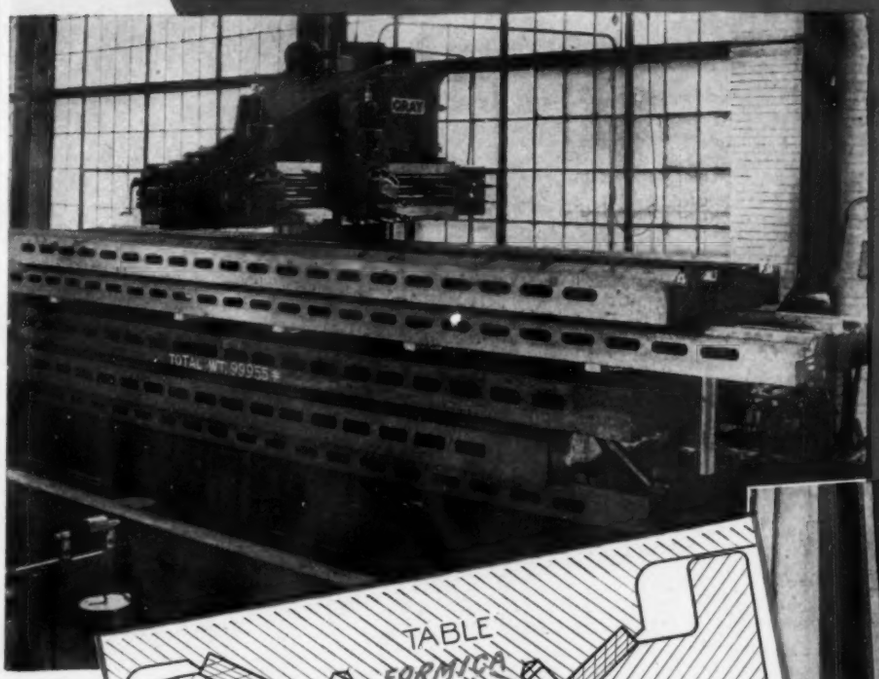
IS IT SAFE TO GIVE CREDIT?

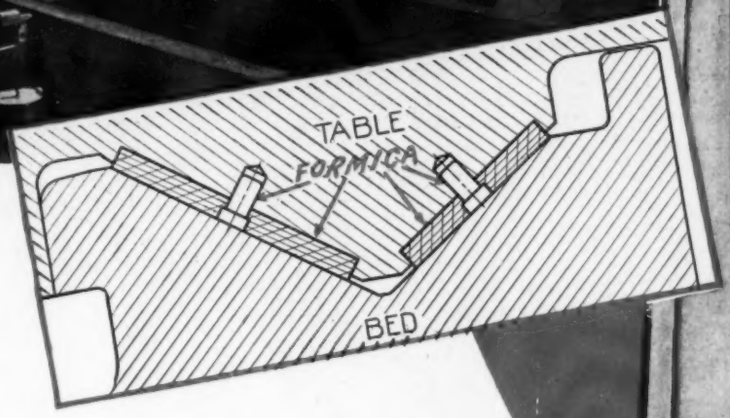
It is even more significant to ask, "Is it safe *not* to give credit where it is due?" Does the captain of any team get the best work from it by withholding credit for meritorious performance? To give it is to induce even greater efforts to excel.

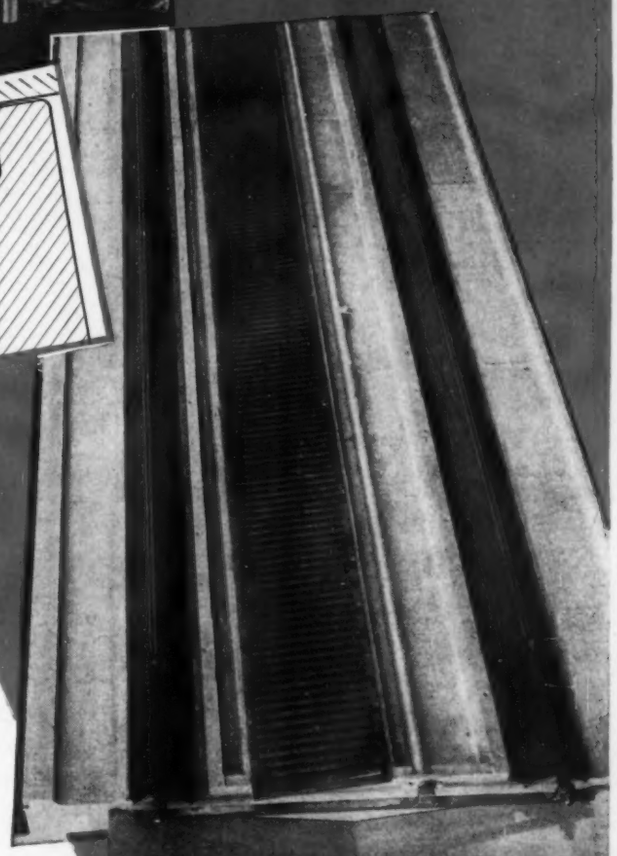
The fear that a man, if praised, may ask for an increase in pay or a better job is the reasoning of a second-class brain.

All men desire to make progress and know, even as they know their bosses' qualities, when they are making strides in their work. If credit,

A JOB THAT PROVES THE "WEARING QUALITY" OF FORMICA







FORMICA ways, bearing many tons of weight, and operating at speeds up to 380 feet per minute have been used on giant planers produced by the G. A. Gray Company, Cincinnati. After years of use they show no wear or deterioration whatever.

This is proof of the adaptability of this modern material for wearing surfaces in all sorts of machinery. These ways are used to guide the machine, and accuracy of its output depends on them.

They have a non-scoring and wear-resisting quality that makes them the best of possible materials for the purpose. Another important quality for high speed operation under heavy weight is their heat-insulating quality. This prevents heat penetrating to the metal table support, changing its dimensions and causing it to curl.

Formica engineers will be glad to discuss similar applications and recommend the most desirable grades.

FORMICA
TRADE MARK REG. U.S. PAT. OFF.

THE FORMICA INSULATION CO., 4662 SPRING GROVE AVENUE, CINCINNATI 32, OHIO

when earned, is never given, the man concerned is being painly told that he is too good for his firm. There are many firms whose policy is that all the effective brains are—must be—covered by the hats worn by certain people. No one else can be recognized. This is unfortunate but true, and brings about its own reward, often not desired or expected.

A large and famous firm was concerned because it lost its best of its young men due to its policy of never giving credit. The better the work done, the more they were fearful of losing the man responsible. Some of their men left, to become eventually directors of other concerns; others became works managers. The firm retained the men without initiative, without ambition, and had an obedient, second-grade staff. But this was in accord with the managing director's policy. "I will do the thinking; all I want from my staff is obedience."

An eastern sage said to his son, "Some men know not, and know not that they know not. They are fools; shun them."

J. E. Powell
Lincoln, England

IS APPRENTICESHIP SLIPPING?

The old system of apprenticeship, wherein the youngster is exposed to experience through a stated number of years, seems to be at a disadvantage. One chief cause is that the status of the shop foreman has been changed decidedly in the last decade. Heretofore, the "Bull of the Woods," who stands out as a symbol of pre-atom supervision, had nothing to do but to wander around the happy shop, impart sound advice, and keep a sharp lookout for the crafty fellow who delighted in putting things over on the firm. He used his abundant spare time to good advantage by putting the apprentice boy through his paces.

His more unfortunate modern counterpart, the streamlined executive, is called upon to spend considerable time on the interdepartmental phone, must study intricate cost charts, keep infinite records devised by the super-brains in the main office, attend this and that meeting and then, if he has any time to spare, drags around his dominion to get a general idea of what is going on.

Under these conditions the appren-

DARNELL CASTERS

For light or heavy duty service Darnell Casters and Wheels are made for a long life of trouble-free usage, to protect floors and increase employee efficiency.

A SAVING AT EVERY TURN

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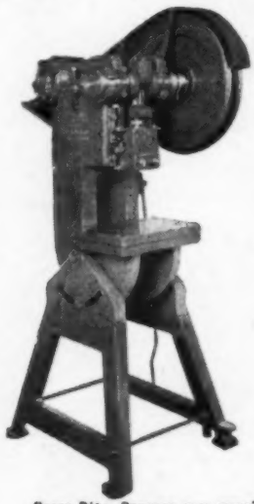
PRESS-RITE PRESSES

for BLANKING FORMING PUNCHING

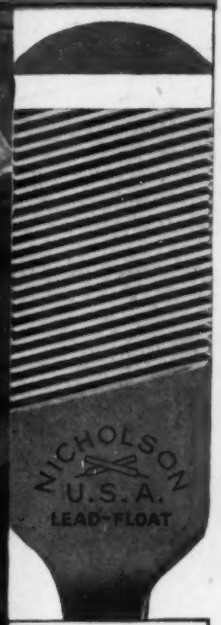


Open Back Inclinable Models

Press-Rite Presses are precision built and can be run at reasonably high speeds, will do light work with large size dies. Built in several sizes, Latest design, simple and rugged construction efficient, durable and dependable. Good deliveries—check with your dealer or write to Dept. A-6 for complete information.

Sales Service Machine Tool Co.
2363 UNIVERSITY AVE ST. PAUL 4, MINNESOTA

A "SMOOTH SHAVE" for soft metals



▲ *Flat side*
HALF ROUND LEAD FLOAT
▼ *H.R. side*

YES, the Nicholson or Black Diamond Lead Float File actually "shaves" thin slices from such extra-soft metals as lead and babbitt. Its coarse, short-angle teeth or "blades" cut away stock rapidly under normal pressure. Yet the same file—used with a lighter touch—produces a smooth finish.

Lead Float files are made in both Flat (rectangular cross-section) and Half Round shapes. In the above illustration, the Half Round back of a Lead Float file is being used to smooth up the concave edge of a babbitted bearing. This shape is also useful in reaming lead-pipe fittings and finishing off solder joints.

Nicholson or Black Diamond Lead Float Files—both Flat and Half Round—are widely used by industrial plants and machine shops on soft bearings and moulded parts; and by shipbuilders, plumbers and plumbing manufacturers.

For these—and other special-purpose files—consult your industrial distributor. For special technical information, be free to write us direct.

NICHOLSON U.S.A.

NICHOLSON FILE CO. • 29 ACORN STREET, PROVIDENCE 1, R. I.
(In Canada, Port Hope, Ont.)

BLACK DIAMOND TRADE MARK

NICHOLSON FILES *FOR EVERY PURPOSE*

SAVE SUPERVISION

in fitting

PRECISION PARTS

YOU PROBABLY KNOW Laminum shims as assembly time savers. But have you overlooked the fact that in fitting machine parts by peeling these precision laminations, considerably less supervision is required. You have the certainty of uniform accuracy . . . with no spoilage. Your request for data invited.

Laminum shims are cut to your specifications. For maintenance work, however, shim materials are sold through industrial distributors.

Laminated Shim Company, Incorporated

50 Union Street • Glenbrook, Conn.

LAMINUM

THE SOLID SHIM THAT peels FOR ADJUSTMENT

2221

tice is forced to gather information from anyone who is kindly disposed enough to impart it.

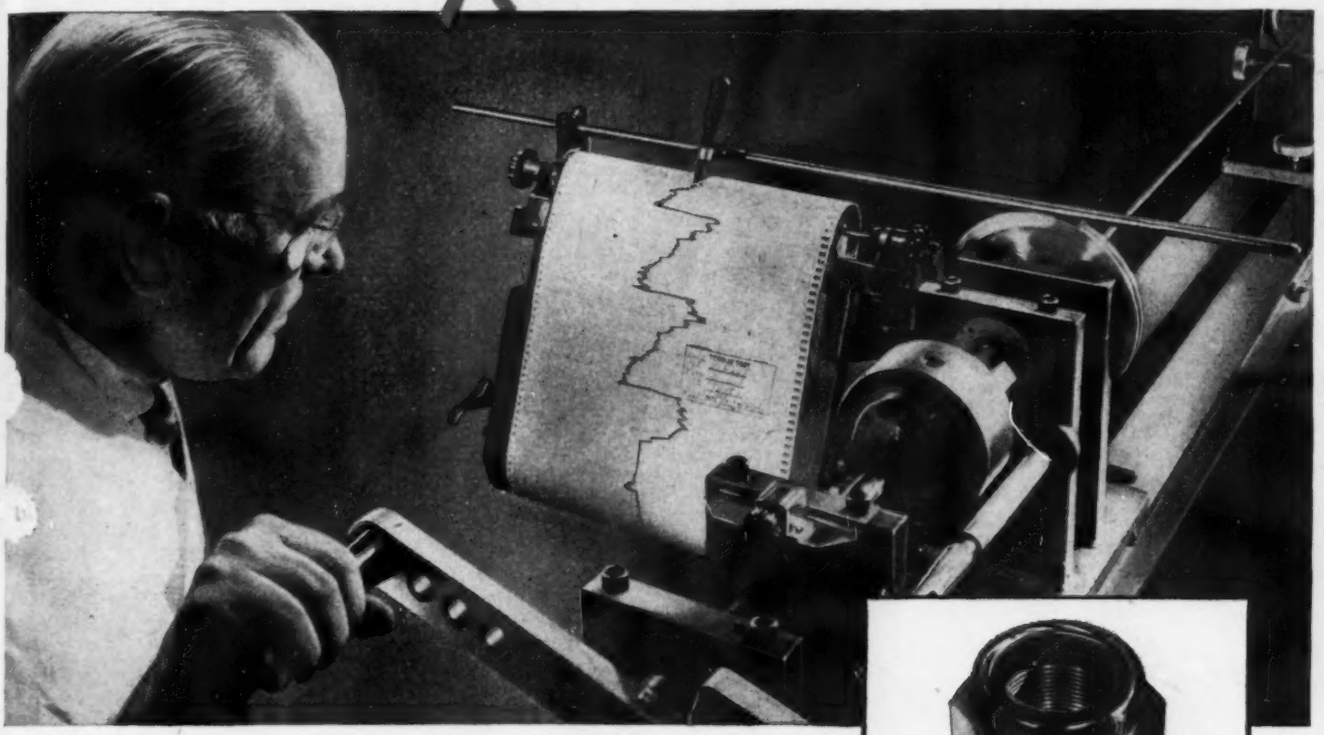
No, we can't let the poor kid down like that. With the educational facilities which we now have, there is no reason why a boy cannot learn the fundamentals of his trade more quickly than he could. The distressing thing is, however, that the learner is deprived of the infinite variety of jobs in which considerable beneficial experience is obtained. The formal system of modern times deprives the youngster of development in resourcefulness so indispensable in times of emergency. Take the micrometer measuring instruments away from the modern-trained so-called mechanic and he becomes a helpless babe-in-the-woods —the chances are that he will mistake a large pair of friction-joint outsides for an ice-tong.

There is nothing so effective a learning "on the job." I trust that I am not misunderstood by the advocates of vocational training in our schools. I am for it. However, wh I am trying to point out is that whi in most cases, the effort to put over the instruction is commendable and effective for the few conscientious students who are able to concentrate, the distressing fact remains that the great majority of the boys haven't got their heart in the work. A great number—too many, in fact—have their minds too much on current sports, how much "go" their hopped-up hot-rods have, or in lingering memories of some good-looking, fire-breathing blonde. The old-fashioned apprentice put first things first, and switched his thoughts over to irrelevant things after a double-decked supper. In too many cases the student (I'll use that term for convenience) appraises his own efforts in terms of the credits he is going to receive. He too often gives the impression that he doesn't have to take the "stuff" anyhow.

The one great consolation in the vocational course in the high school is that it is a proving ground for future mechanics. The instructor, if he is on his toes, can spot the "natural" and strongly urge him to follow the trade. A noted psychologist recently made the claim that no one did anything naturally; that what he did was influenced by his environment. Horsefeathers! Of all the places wherein one can pick out an individual whose naturalness to the work is clearly evident is a machine shop.

In conclusion, I would like to call upon the leaders of industry to put

A-N TORQUE TESTS *Prove Reusability* OF ELASTIC STOP NUTS



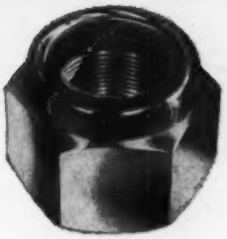
—the Red Elastic Collar provides dependable locking torque for RE-USE!

Army and Navy specifications for aircraft lock nuts include a specific torque test to prove locking effectiveness. Lock nuts have to maintain adequate locking torque through 15 on-and-off cycles.

ESNA Elastic Stop Nuts—with the Red Elastic Collar that has become a symbol of security to all aviation engineers—remain self-locking against Vibration, Impact and Stress Reversal in both pre-stressed and positioned settings.

In addition, the self-locking, self-sealing and reusable Red Elastic Collar protects the bolt. It does not deform the bolt, damage the threads or gall the finish.

Reusable ESNA Elastic Stop Nuts provide dependable protection against Vibration, Thread Corrosion, Thread Failure, and Liquid Seepage. This multiple protection—which has made Elastic Stop Nuts the standard fastener on many products—also achieves the double economy of inventory simplification and reduced procurement costs. ESNA engineers are now ready to study your fastener problems. Address: Elastic Stop Nut Corporation of America, Union, New Jersey. Sales Engineers and Distributors are conveniently located in many principal cities.



The RED ELASTIC COLLAR

— denoting an ESNA product —

. . . is threadless and dependably elastic. Every bolt—*regardless* of *commercial tolerances*—impresses (does not cut) its full thread contact in the Red Elastic Collar to fully grip the bolt threads. In addition, this threading action properly seats the metal threads—and eliminates all axial play between bolt and nut threads.

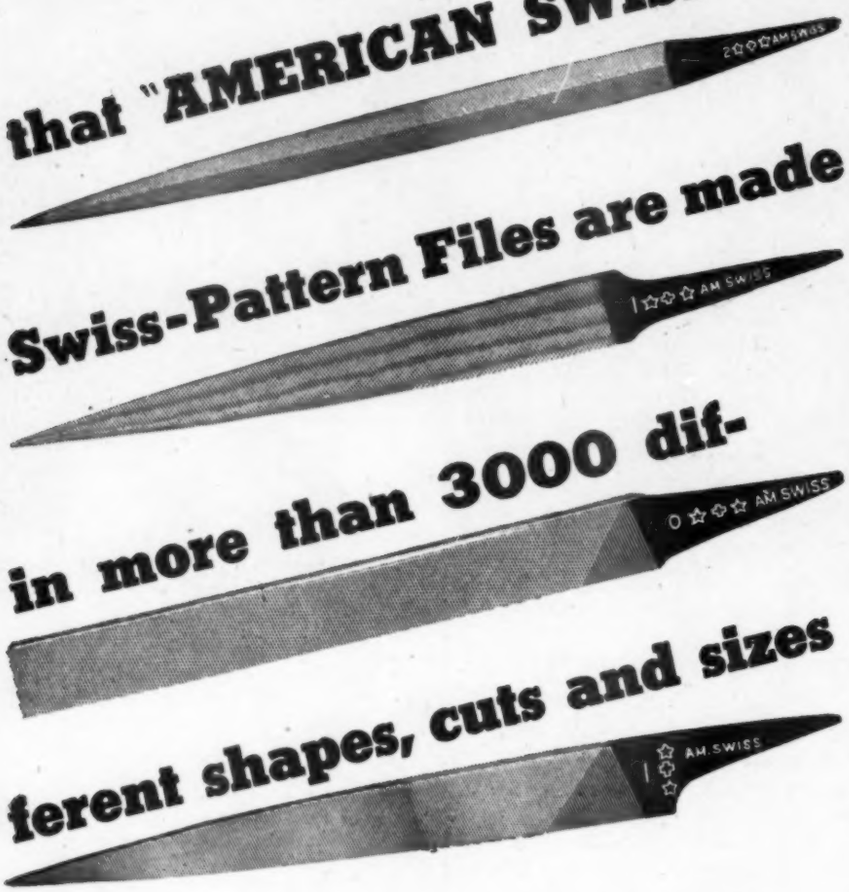
Torque tests—for Elastic Stop Nuts—are based on a steel-to-steel frictional coefficient of .18. Bolt loadings are figured at 40,000 psi for commercial bolts; 90,000 psi for aircraft bolts.

ELASTIC STOP NUTS

PRODUCTS OF: ELASTIC STOP NUT CORPORATION OF AMERICA

Do You Know...

that "AMERICAN SWISS" Swiss-Pattern Files are made in more than 3000 different shapes, cuts and sizes



This wide selection gives you exactly the right precision tool for every intricate or accurate filing job . . . and their sharp, long-lasting teeth assure best results at lowest cost.

AS-133

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American Swiss File & Tool Co., Elizabeth 1, N. J.

ASK FOR THEM BY NAME

American Swiss

SWISS PATTERN FILES

the pressure on the powers in education. Let them see to it that a potential mechanic is properly assigned to a competent, well-paid, practical counsellor.

John Homewood
Ontario, Calif.

•

Before any boy decides to spend four years working at the apprentice rate of pay, he should make sure that the shop has a well-organized apprentice system. The course should include the setup and operation of all general-purpose machine tools, bench work, assembly, toolmaking, inspection, in conjunction with related school work.

The apprentice should learn to set up for long production runs so that he will be familiar with this class of tooling, but he should not be required to operate such jobs for more than a few hours at a time. Many hours should be spent o na variety of small-lot jobs, which require some ingenuity to set up with simple universal tools. Towards the end of his apprenticeship, the apprentice should have an opportunity to serve in a supervisory capacity to learn some of the fundamentals of leadership.

The length of time to be spent on each general-type machine should be standardized by the apprentice department of the organization and should not depend on how well the apprentice is liked by the foreman of each department.

Since it is obvious that the average high-school boy is not capable of evaluating an apprentice system, the responsibility for guiding his choice must be placed on the school.

"Al's" boss taught him a lot more than technical subjects, and the lessons learned were valuable, but those things can also be learned by contact with many different men. As "Ed" says, " . . . if all the boy's contact was with one boss whose ideas on life were wrong, it would be too bad for the boy."

C. A. Johnson
Springfield, Mass.

•

Success or failure of apprenticeship training depends to a great degree on the men who are doing the training. Ed became a good mechanic because his instructor had his interest at heart. He taught Ed the business from the ground up. The fact that he did not teach him geometry and algebra may have been because these subjects were not considered important for mechanics at that time.

Apprentice-training systems, as they are set up today, with their

NOW! *Rayon* IN DAYTON *Thorobred* V-BELTS

- MINIMIZES BELT STRETCH
- INCREASES FLEX STRENGTH
- INCREASES V-BELT LIFE

MINIMIZES V-BELT STRETCH—Low stretch, high tenacity *Raytex Fortified Rayon Cord, used in the neutral or strength section of Dayton V-Belts, is manufactured in continuous filaments . . . then twisted together to form cable-like cord, just as steel wires are twisted together to make a steel cable. That's why Raytex Fortified Rayon Cords practically eliminate stretch in the new Dayton Thorobred . . . which means fewer take-ups and less maintenance with every belt pulling its share of the load.

INCREASES FLEX STRENGTH—Because Rayon Cords are made of continuous filament, high tenacity Rayon, they combine high strength with greatest flexibility. This enables Dayton Thorobred V-Belts to flow smoothly around pulleys while transmitting power at maximum efficiency.

INCREASES V-BELT LIFE—Because Rayon Cords have greater strength in small diameters, Dayton Belt Engineers are now able to build a more compact, thinner neutral section of maximum pulling power. Thus, bending stresses are minimized which, in turn, lengthens the life of Dayton Thorobreds.

The new Dayton Thorobred V-Belts built with *Raytex Fortified Rayon Cord are now in production . . . will be available soon in all sizes. Write for free sample of this new cord and descriptive booklet.

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V-BELT BUYERS! A leading mill supply house near you stocks Dayton V-Belts . . Look for the name in the yellow pages of your telephone directory

Dayton Rubber

THE MARK OF TECHNICAL EXCELLENCE IN NATURAL AND SYNTHETIC RUBBER

THE WORLD'S LARGEST MANUFACTURER OF V-BELTS

LIKE DEATH AND TAXES unless...

Rust is a natural chemical action. As such it is inevitable when ferrous metals are exposed to the atmosphere. The only sure preventative is to protect the metal with a moisture-proof substance. NO-RUST *is* that compound . . . scientifically developed for the specific purpose of rust prevention. Every condition of exposure, temperature and time has been taken into consideration. Exhaustive tests have proved the product.

NO-RUST PREVENTS RUST THE ONLY SURE WAY!

NO-RUST is compounded in various viscosities to meet varying conditions of use. The most common in use are the light bodied liquids which can be either brushed or sprayed. These compounds dry almost instantly to a flint-like hardness that will neither chip nor crack . . . never sticky or greasy. Despite this firm setting, NO-RUST is quickly removed by wiping with kerosene or distillate.

● Send for free sample of NO-RUST, stating the purpose for which you intend using it.

If you have other problems relating to protective finishes, tell us about them. We specialize in developing finishes for unusual conditions.

Frost PAINT AND OIL CORPORATION
MINNEAPOLIS 13, MINNESOTA

scheduled hours for each operation, special classes in the plant, or recommended evening classes in related subjects, plus the advantage of being conducted by specialists on the various machines and other phases of toolroom work, should result in better-trained mechanics. But, unfortunately, this is not always the case. Like many projects in which a great number of people are involved, this matter of training apprentices does not get wholehearted cooperation. Some foremen, though otherwise fully capable, make poor instructors. They may lack interest in this phase of their job, or may be too impatient properly to train people.

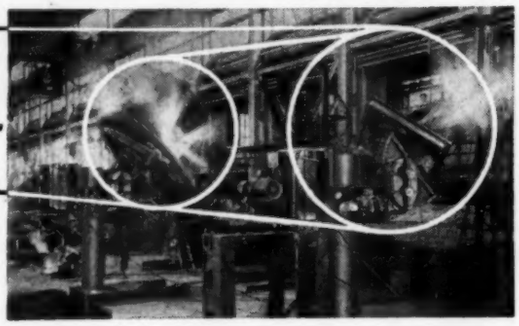
Maximum results are not achieved because of poor co-ordination between shop work and classroom work. The co-ordinator may assign the apprentice a subject for study that he may never use, or which he can not apply to his shop work for several years. These subjects should be so timed as to fit in with the shop work he is doing at that time in order to keep the apprentice thoroughly interested. Proper timing will prove to him the applications.

Another reason why maximum efficiency is not attained from the apprentice-training program is the fact that the boy may become exceptionally proficient on a certain operation. Some foremen take advantage of this fact and use devious ways and means to keep the boy on this operation, knowing that this action disrupts the boy's schedule, and depriving him of training on some other operation. This is a very common fault, and certainly harms the boy as well as the training program. Strict adherence to the scheduled training program is very important in all cases to give the apprentice the benefit of learning all he possibly can about his trade in the allotted time.

These obstacles in the path of modern planned training programs can all be eliminated by the people who institute the program. None of them are so serious that they cannot all be corrected by a little training of the foremen. When this is done, I believe that this method will prove to be very much superior to the old one, and will continue to improve as more effort is put into its application.

Robert Knotek
University Hts., O.

More WELDING going on here.....



More welding and less time spent in flopping, propping up and crawling around weldments is the end result of the C-F Positioners in this welding department.

Mounted on C-F Welding Positioners, weldments can be quickly brought into position for a downhand pass—better, more uniform welds with resulting economies and production increases follow. Weldors spend more time welding when they work with C-F Positioners because one "set-up" on the table allows them to maneuver the job without assistance, whether hand or power operated Positioners are used.

Power operated, variable speed C-F Positioners, with table rotation speeds in any range from 0 RPM and up, coupled with table tilt to 135° from the horizontal make them the logical choice for any production welding operation. Like all C-F Positioners, they have drilled tables for easy set-ups or tables can be quickly removed for installation of special fixtures or jigs. Write for Bulletin WP 22. CULLEN-FRIESTEDT CO., 1313 S. Kilbourn Ave., Chicago 23, Ill.

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

C-F positioned welds mean better, more economical welds

Available NOW on 24-Hour Shipment . . .

R317T, Reynolds new strong aluminum alloy free-machining

SCREW-MACHINE STOCK

Are your screw-machines hungry for stock? Men idle? Orders unfilled?

Then wire, write or phone us today for a supply of R317T, Reynolds new strong free-machining aluminum alloy screw-machine stock.

24-HOUR SHIPMENTS

R317T is now available in all standard sizes of rounds or hexagons for 24-hour shipment.

ADVANTAGES OF R317T

This new Reynolds Aluminum alloy is becoming famous for making any finished shape requiring free-machining. Weighing only ⅓ as much as steel or brass, it puts less strain on machine bearings—is easier on cutting tools—trims with small, free-falling, easily packed chips.

R317T COSTS LESS

Finished products of R317T cost less than brass because of light weight and small loss in cutting. Often you get a *better* finished product from this sturdy, durable, war-developed alloy.

R317T is superior to other aluminum alloys for machining because all cold-drawing strains are relieved with a final heat treatment in finished form—minimizing warp during machining.

SOLVES YOUR PROBLEMS

Reynolds R317T is the new screw-machine stock that may solve your problems now. Save time along your line! Fewer rejects! Finer production faster, at lower cost.

For 24-hour shipments or information, get in touch with the nearest Reynolds office or write, wire or phone Reynolds Metals Company, 2523 South Third Street, Louisville 1, Kentucky. *Offices in principal cities.*

STANDARD STOCK AVAILABLE NOW

17S-T, Reynolds standard screw-machine stock also available on 24-hr. shipment.

• • •

STRUCTURAL SHAPES

Quick shipment. Strong alloy aluminum rolled structural shapes.

FORGINGS—FORGING STOCK

Early shipment on all types and kinds of aluminum forging stock or press forgings contained in an area 7" x 16". Engineering help in designing dies.

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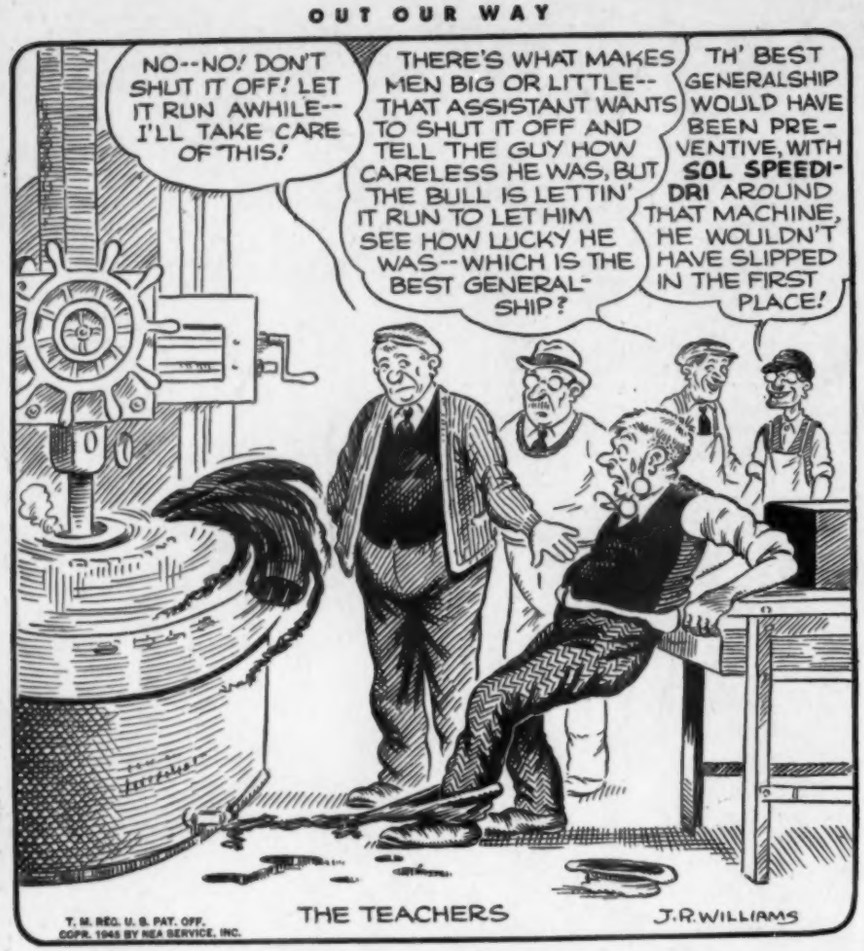
OUT OUR WAY


NO--NO! DON'T SHUT IT OFF! LET IT RUN AWHILE-- I'LL TAKE CARE OF THIS!
THERE'S WHAT MAKES MEN BIG OR LITTLE-- THAT ASSISTANT WANTS TO SHUT IT OFF AND TELL THE GUY HOW CARELESS HE WAS, BUT THE BULL IS LETTIN' IT RUN TO LET HIM SEE HOW LUCKY HE WAS--WHICH IS THE BEST GENERAL-SHIP?
TH' BEST GENERALSHIP WOULD HAVE BEEN PREVENTIVE, WITH SOL SPEEDI-DRI AROUND THAT MACHINE, HE WOULDN'T HAVE SLIPPED IN THE FIRST PLACE!
T. M. REG. U. S. PAT. OFF. COPR. 1946 BY NEA SERVICE, INC.
THE TEACHERS
J.R.WILLIAMS

SAFETY FIRST AND LAST WITH "SOL-SPEEDI-DRI"

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Suppliers: *East*—Safety and Maintenance Co., Inc., No. 1 Wall Street, New York 5, N. Y. *South, Midwest, West Coast*—Waverly Petroleum Products Co., Drexel Building, Phila. 6, Pa.

"Quotes"

Have You Asked Your Employees?

JACK WOLFF, management consultant, had this to say at the Production Conference of the American Management Association about workers' attitude toward cost reduction and methods improvement:

"Shareholders and investors are beginning to tire of decreased earnings and depreciated values because of labor trouble. They will not continue to take such losses for granted and be satisfied with the excuse that it is labor's fault. They are going to look around and see that some plants, those which do not make the headlines, are running profitably with a happy and cooperative industrial family.

"They are going to ask embarrassing questions as to why some managements have constantly recurring work stoppages and impossible demands from their employees while other managements in the same locality, industry or even with the same union local produce profitably without labor trouble.

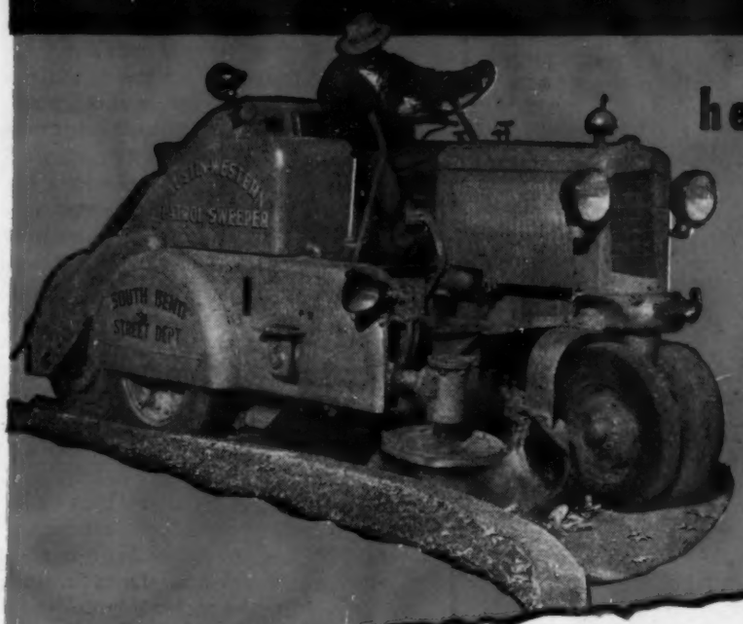
"Top management soon must hold its middle management, its executives and supervisors, responsible for securing the intelligent and enthusiastic cooperation of the working force. This will become inevitable because investors are going to hold top management responsible.

"Today, the members of management are expected to get the maximum applied horsepower out of plant equipment. Tomorrow, they will be held equally responsible for getting the maximum applied brainpower, good will and energy out of the human organization under their charge.

"Some may believe it is dangerous to ask employees for help and suggestions because they may try to take over management functions. It doesn't work that way in practice. When the supervisors and employees analyze their own operating or personnel problems, they work intelligently and sincerely to arrive at sound conclusions.

"If some among them get off on the wrong foot and insist upon unsound proposals for more authority, the majority of the group takes care of the situation by putting the headstrong few in their places. If top management bears down on a headstrong minority, it merely gives them

ORANGE ROLLER BUSHINGS



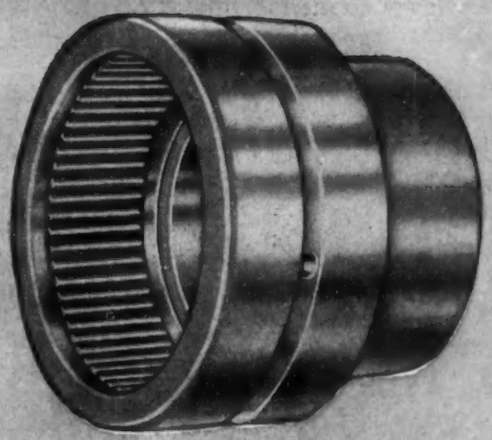
help maintain smooth power transmission in AUSTIN-WESTERN PATROL-SWEEPERS

These compact, well-designed Austin-Western Patrol Sweepers are widely used by street departments and industrial plants. To meet the continuous working requirements, the lower transmission shaft and idler sprocket in many of these models run on Orange Roller Bushings, which are performing with complete satisfaction.

ORANGE Roller Bushings have earned a reputation for doing their job well—whether used in essential, every-day installations or in unusually gruelling and exacting applications.

In any case, designing engineers have discovered that Orange Roller Bushings carry heavy loads in small space, provide unfailing anti-friction operation under severe stresses, yet retain their quiet, trouble-free running over long service periods. Closer internal running clearances minimize mis-alignment of rollers. High standards of dimensional uniformity, hardening, finishing and assembly are rigidly maintained.

If you want to reduce friction—improve performance—and protect the service life of your product, install Orange Roller Bushings. Our engineers are glad to consult on any application. Write for Engineering Data Book showing full range of standard types and sizes to meet practically all requirements.



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For Long, Accurate Cutting...

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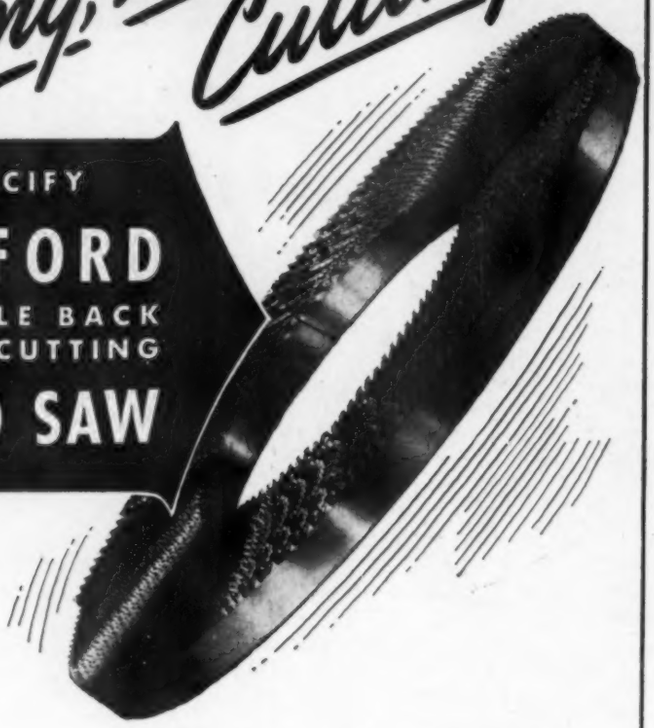
BAND SAW



THESE flexible back, metal-cutting saws have teeth as hard and as tough as a hack saw blade. Made from electric furnace steel, and heat treated by the most experienced producers of metal-cutting band saw blades. Used widely in foundries and metal-working plants for cutting all types of ferrous and non-ferrous metals.

and MILFORD PROFILE SAW

The *narrow* band saw for all contour sawing, jig, and band saw machines. Made from the same steel as the famous MILFORD flexible back saws, but designed and heat treated for cutting irregular shapes, either internally or externally, in metal or plastics.

Order from your Mill Supply Distributor. He is always ready to serve your needs for all factory and mill supplies as well as MILFORD hack saw and band saw blades.

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a "cause" with which they succeed in winning others to their side. But when top management steps aside, the majority supports the sound procedure and the unsound minority of 'distrubres' caves in because it has lost its cause."

•

A Vote for Measured Day Work

AT THE CHICAGO Production Conference of the American Management Association, F. A. Schotters, former vice president, The Crosley Corp., had this to say in comparing incentive plans and measured day work:

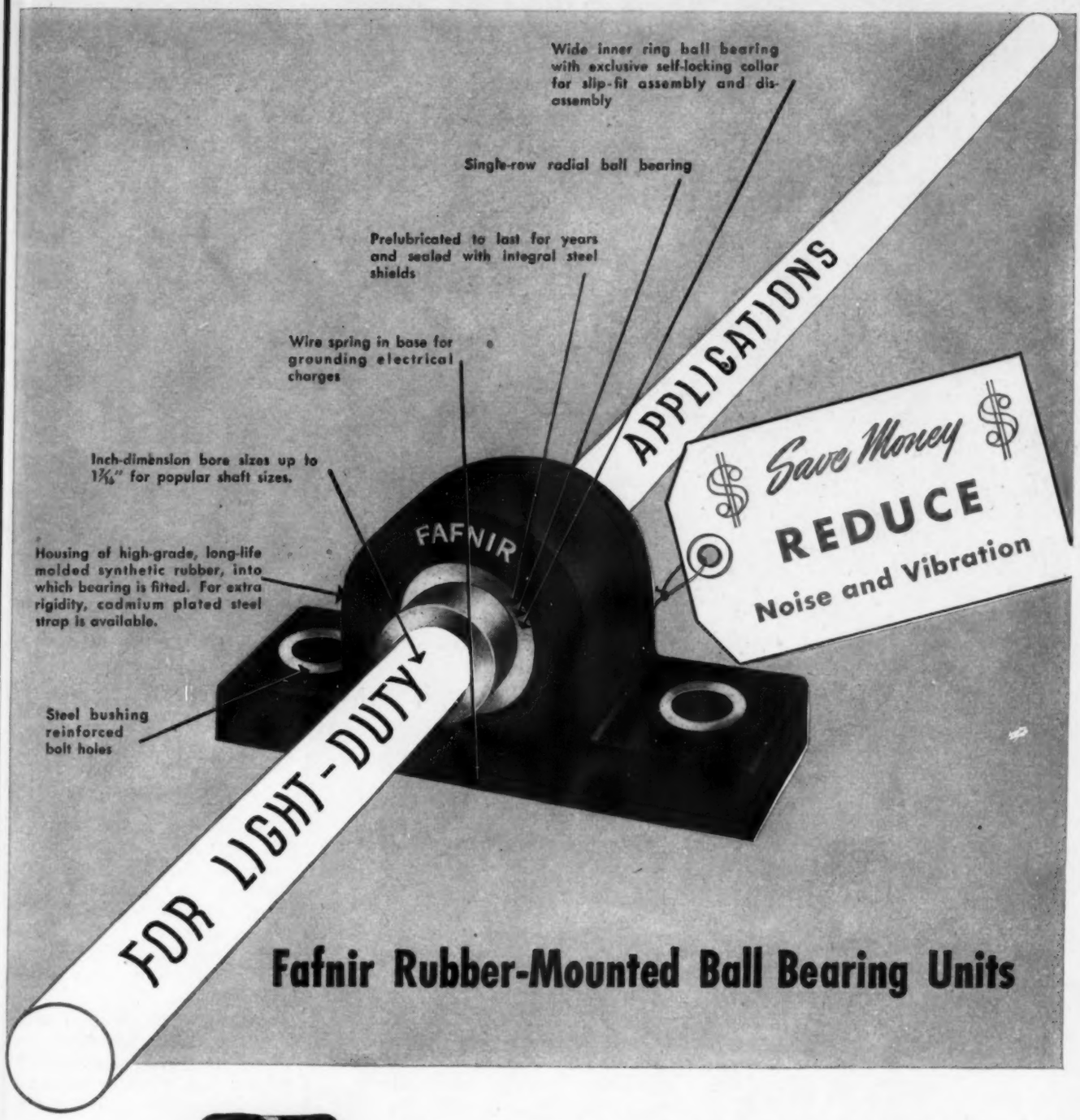
"From actual experience in changing over from an incentive plan to measured day work, grievance in a plant employing approximately 1,800 employees were reduced from one to three written grievances presented per day to an all-time record in the plant of having only one written grievance presented in a period of over four months. This covered all types of grievances and was not necessarily confined to those grievances originating from the operation of the incentive plan.

"Operation of the measured day work plan does offer the employee an incentive to produce. He knows that he will earn the maximum rate per hour and also that the standard for the production required of him, as set up for his operation, reflects all the production engineering, motion study and job analysis talents available to management.

"He feels free to discuss any matter as to the standards with his foreman, realizing that the standard set is the basis of cost used in determining the selling price of the product. The employee knows that the rate which he receives is equal to the area or industry rate for the same job classification.

"In setting up comparisons of these rates, actual hourly earnings of those companies using incentive plans are used. A comparison of base rates used in an incentive plan, with those used in a measured day work plan, would reflect the higher rate of the measured day work plan. We may say it this way—that in a measured day work plan, the rate established includes a predetermined amount of premium or incentive pay.

"My observation has proven a considerable reduction in the cost of inspection and quality control in the operation of a measured day work plan over that of the operation of an incentive plan. A saving in scrap loss, in approximately the same pro-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Single-row radial ball bearing
Prelubricated to last for years and sealed with integral steel shields
Wire spring in base for grounding electrical charges
Inch-dimension bore sizes up to 1 7/16" for popular shaft sizes.
Housing of high-grade, long-life molded synthetic rubber, into which bearing is fitted. For extra rigidity, cadmium plated steel strap is available.
Steel bushing reinforced bolt holes
FAFNIR
APPLICATIONS
Save Money
REDUCE
Noise and Vibration
FOR LIGHT-DUTY

Fafnir Rubber-Mounted Ball Bearing Units

. . . also rubber mounted flange and cylindrical cartridges

HERE'S A BEARING BARGAIN for manufacturers of small fans, domestic heating, ventilating and air-conditioning equipment, and small conveyor systems. In one economy-priced package you get low starting torque to save motors, up to 10% power saving, automatic lubrication, self-maintenance, and faster, simpler assembly . . . all wrapped up in a noise and vibration absorbing synthetic rubber mounting. It's a competitive advantage for you tagged with a bargain price. Write for descriptive folder showing complete line of rubber-mounted units. The Fafnir Bearing Company, New Britain, Conn.

MOST COMPLETE LINE IN AMERICA

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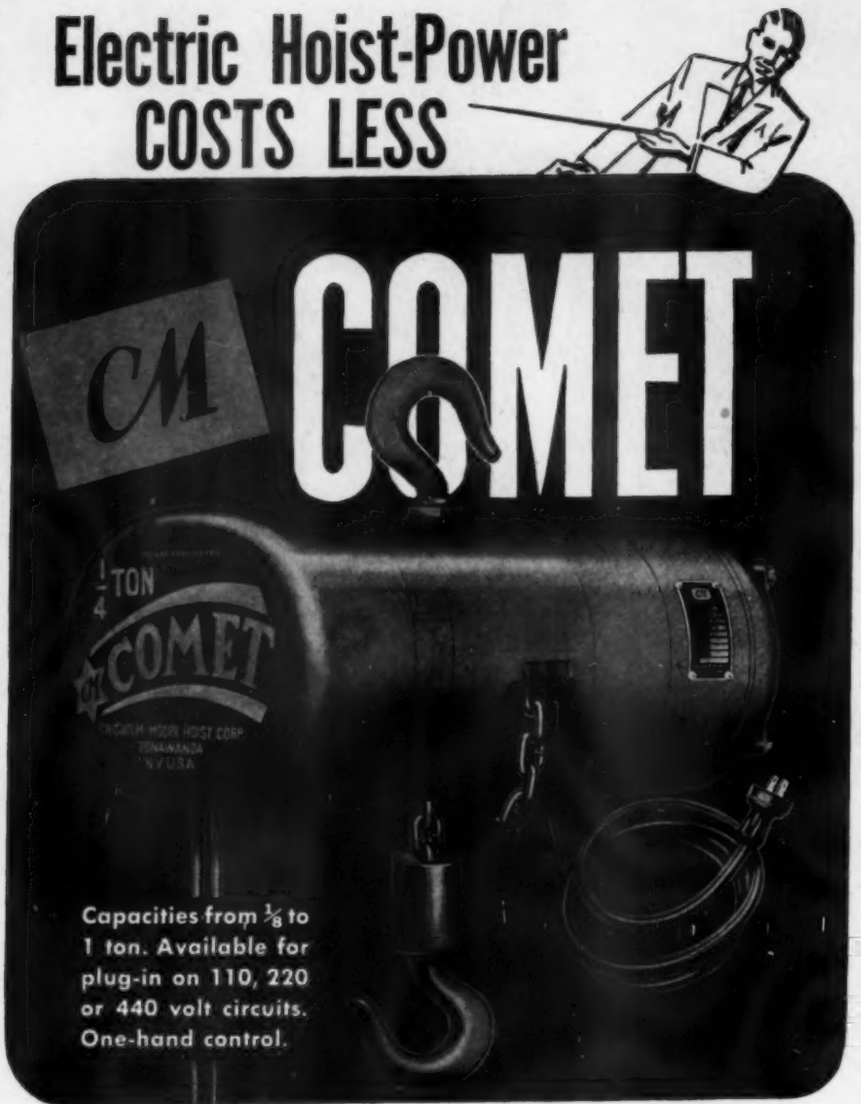
Electric Hoist-Power COSTS LESS



Capacities from ⅛ to 1 ton. Available for plug-in on 110, 220 or 440 volt circuits. One-hand control.

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Manual handling of materials is inefficient . . . more so today than ever before. The CM Comet makes substantial savings in materials handling costs . . . is doing it every day in thousands of plants. Possibly the CM Comet can save a good many dollars for you too. Check up on the materials handling situation in your plant. CM Bulletin 138 . . . available for the asking . . . will bring you complete details about the Comet.

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portion, is also shown by my tests.

"Actual production inspection is a direct responsibility of the department head or supervisor of the production department. He does, however, exercise no control over the quality-control group which is entirely distinct from the inspection department and reports direct to top management. Inspection operations are usually handled by the operators, with the exception of periodical checks by roving inspectors.

"The inspection responsibility in the hands of the supervisor answers the problem of producing a quality product and points up the fact to all employees that quality cannot be inspected into a product but that it must be produced in the performance of each operation.

"It is my own personal opinion and based on the experiences I have had with both plans, that the measured day work plan, taking into account more complex elements of performance, does offer to management the opportunity of applying the same hard-headed attention and effect it has given in the past to mechanical factors, to the human factors which are so easily reached through a measured day work plan."

•

Dollars and Sense of Materials Handling

EARL I. BURKE, Manager of Shipping, Republic Steel Corp., talked dollar sense at the 1947 Materials Handling Exposition and Conference. In discussing the cost of mechanical handling equipment, he said, "Sometimes management even conjures up notions of vast expenditures which it feels cannot be afforded.

"An effective handling system need not be costly nor elaborate, and any business can afford capital investment which reduces operating cost. An effective system involves the proper weight of lifts or packages in order to use equipment to its maximum capacity and increase the number of tons handled per hour.

"It is costing industry millions of dollars each year for manual labor, accidents, damage claims, wasted space and unnecessary handlings. At the same time, the flow of materials is retarded. . . . Materials-handling methods should always equal or exceed the processing or fabricating flow—and that includes packaging, marking and loading.

"Under existing conditions, no industry can afford to permit any single element in manufacturing to remain as inefficient as many present-day materials-handling methods."

When time is precious—

SPEED YOUR DIE MAKING

SAVE MONEY TOO

Write for New Booklet:

COMPOSITE DIE SECTIONS

Contains complete data on 35 Standard Die Sections, from combinations of which thousands of die shapes can be made—also full information on Special Die Sections, and how to order.

Get Your Copy—
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FCC Composite Die Sections are quickly available to your order. Shipment to your specifications can usually be made in five to ten days.

On large dies or small for blanking, beading or trimming, these prefabricated die parts save steel, and a vast amount of time and trouble in the die shop.

They are made of fine tool steel cutting edges in a selection of grades, electrically butt welded by a special process to non-hardenable mild steel bases. Accurate temperature control assures uniformity of behavior in heat treatment.

Further information is available from any Allegheny Ludlum field representative, or write us direct for engineering data (see details at left).

ALLEGHENY LUDLUM
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Forging and Casting Division
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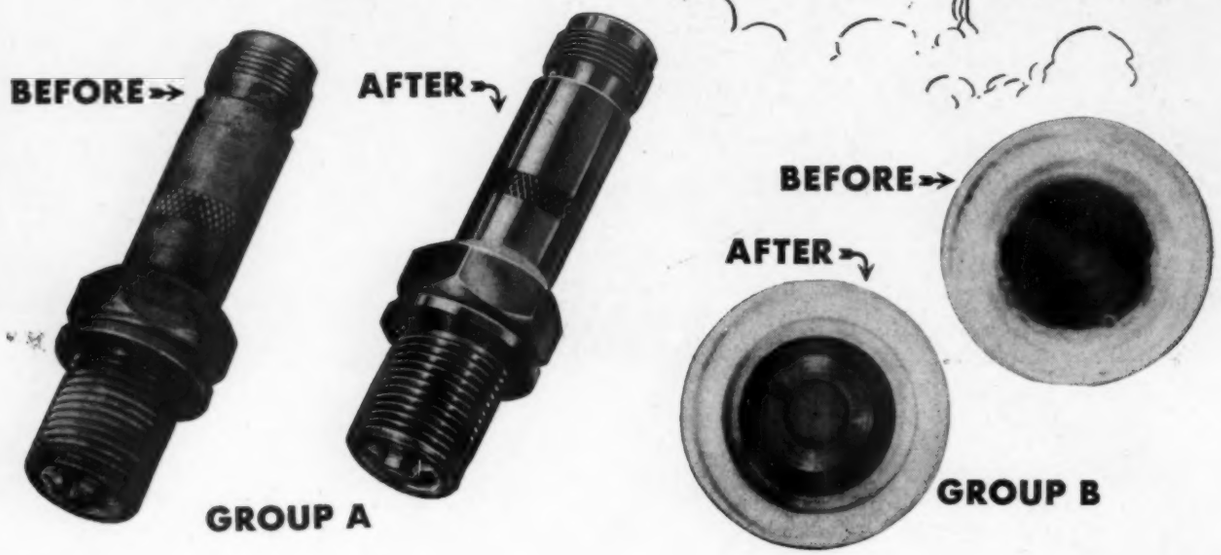
A plug from the air lines!



Osborn Brushes help keep America's Airliners soaring safely in the skies!

CLEAN spark plugs are important anywhere, but they're an absolute "must" in the skies. Airline operators insist on a periodic and very thorough cleaning; one air transport company alone cleans 75,000 plugs every week, reports "after trying various solutions and methods, the following procedure was found to be not only the best but also the most efficient".

The procedure referred to was to use an Osborn Monitor or Wheel on the threads (shown before and after cleaning in group A) and an Osborn End Brush and Situft with solvent on the barrel well (shown before and after in group B). "The work is fast and does not affect the continued engine service of the plugs".

Not only the aircraft industry but *all industries* and virtually all products have areas which should be surface finished to get peak performance from the part and maximum sales appeal for the products.

An Osborn engineer will bring you up-to-date on the latest Osborn-developed brushing techniques and show you how they can be applied to your business—to get a better-performing, better-looking, better-selling product. Just ask us to have him call, without obligation to you, of course.

New Booklet available! When and where to use power brushes—and how to select them. Write for your copy today.

THE OSBORN MANUFACTURING COMPANY
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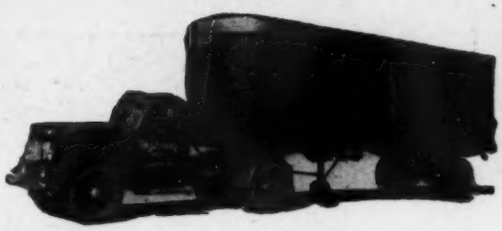
Osborn Brushes

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY

HIGHWAY TRAILER CO. gets assembly into high



Independent investigator finds Phillips Screws cut driving time in half, stop costly driver slips, prevent accidents.

Fastening the roof trim with Phillips Screws instead of with bolts as formerly, which required a man inside and another outside the van. Now it's a one-man job, and in driving 38 Phillips Screws, he saves 15 minutes of the time he'd need to drive slotted screws.

"WHEN YOU'RE DRIVING 552 self-tapping screws on a big assembly job like our closed-van trailer, the Phillips Recessed Head makes a tremendous difference," the chief engineer told a James O. Peck Co. investigator making another survey of assembly savings with Phillips Screws in key plants.

"PHILLIPS SCREWS CUT DRIVING TIME IN HALF. It takes four men just 13 minutes to power-drive all the Phillips Head Self-tapping Screws that fasten the big plywood panels which line our 26-foot trailer vans. Because the driver centers automatically in the Phillips Recessed Head, an assembler doesn't have to be at eye level with the screw, as when using slotted screws. That eliminated the need for platforms which used to cut down working space and slow down the assembly.

"SAVE DRIVER SLIPS that used to cost $2.50 to $3.50. These panels are fastened very near the edges. Before, when a bit slipped out of a slotted screw, the panel was usually split. Phillips Screws eliminated this cost completely.

"EASIER ON MEN'S HANDS. Our assemblers used to get hand cuts, often serious, when bits jumped out of slotted screws. That doesn't happen with Phillips Screws because the bit always centers snugly and stays."

THIS AND OTHER ASSEMBLY STUDIES covering metal, wood, and plastic products, present solutions to assembly problems that parallel those in your plant. Get this wealth of practical, inside information . . . mail coupon.

'Way down by the floor and 'way up to the roof . . . both ways Phillips Screws end the troublesome, time-wasting necessity of eye-level driving of slotted screws.

PHILLIPS *Recessed Head* SCREWS

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

23 SOURCES

American Screw Co.
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Send me reports on Assembly Savings with Phillips Screws.

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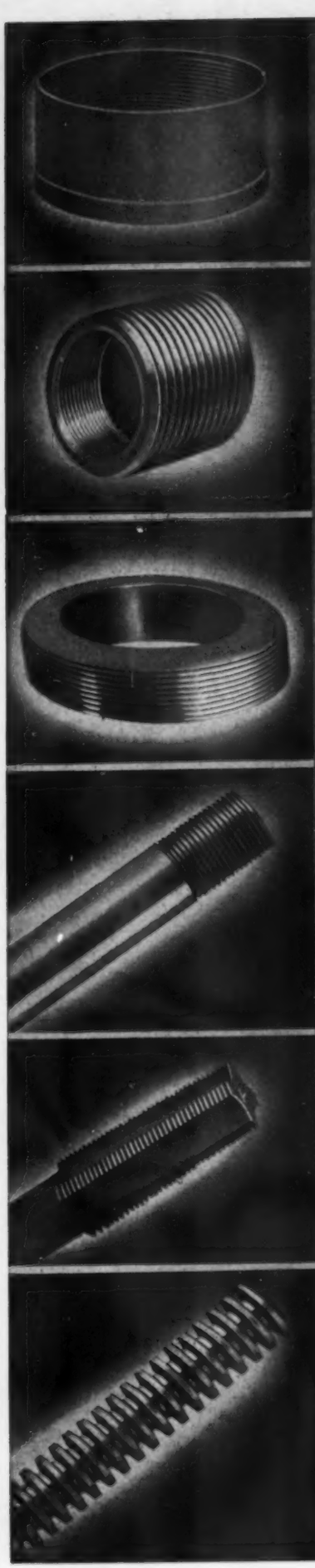
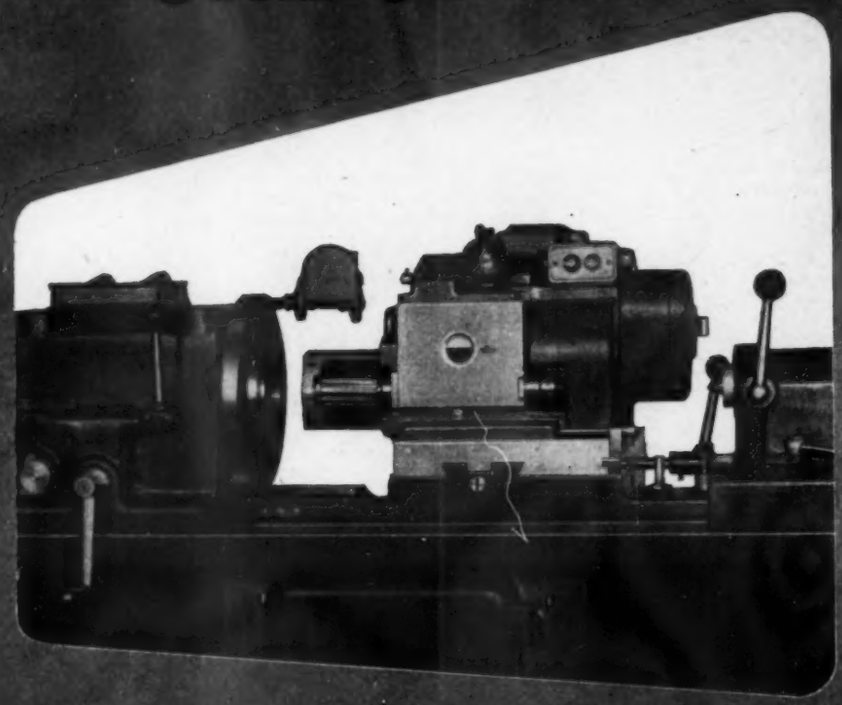


YOUR THREADING JOB MAY BE

ONE OF SIX



If it is versatility you are looking for, Hanson-Whitney Thread Milling Machines have it. Whether the job calls for external or internal threads; right or left hand threads; straight or tapered threads a Hanson-Whitney does it automatically . . . without lost motion or reliance on the human element. The thread cutting control is entirely mechanical. Accuracy can be held to close tolerances . . . production is stepped up and costs are lowered. Our engineers are always ready to help you find new ways to improve your thread milling production. For further information, write: The Hanson Whitney Machine Company, Hartford, Connecticut.

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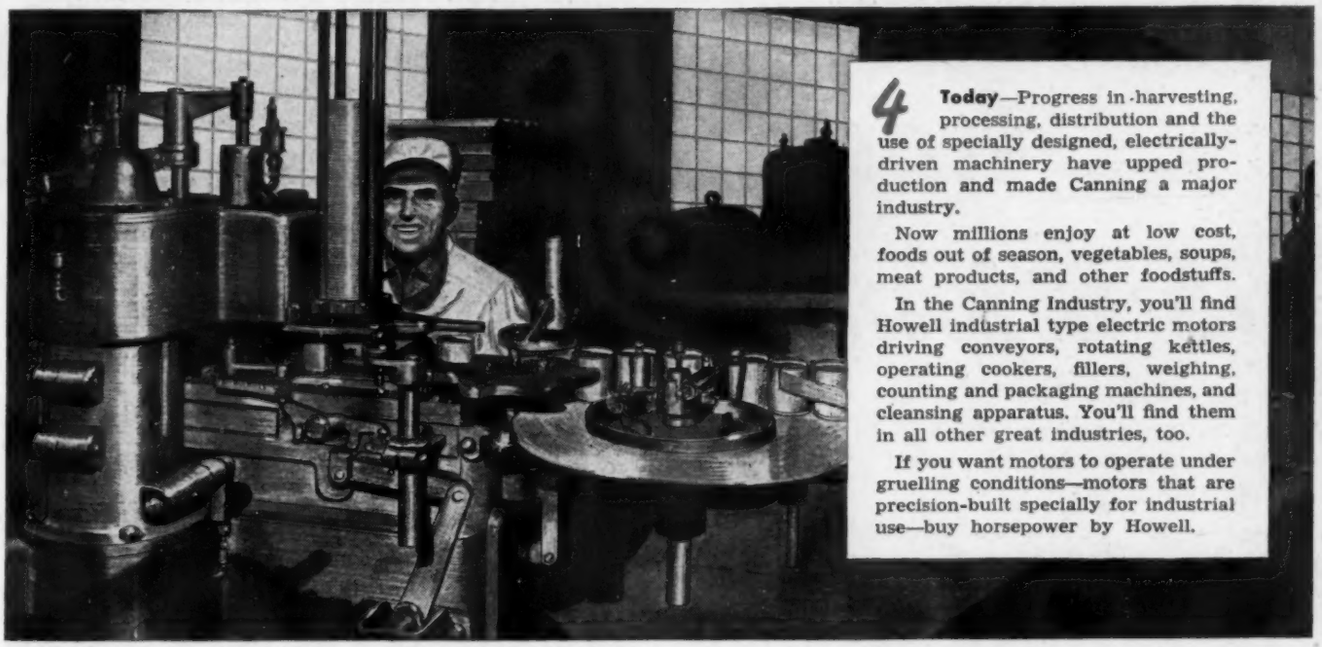
1 **1809**—"Canning" was discovered by Nicolas Appert, a Frenchman. His crude food preserving methods, using bottles for containers, won for him great acclaim and a grant of 12,000 francs from the Emperor Napoleon.

2 **1850**—The art of canning had spread far and wide. In home kitchens, barns, crude buildings, food was "preserved" for future use. Work was done by hand, mostly by women. Electrical horsepower was still to come.

3 **As early as 1915,** Howell engineers were working with machinery manufacturers to apply industrial type motors that were destined to up production, eliminate unnecessary human handling of foodstuff and cut costs.

Then canning became a major industry!



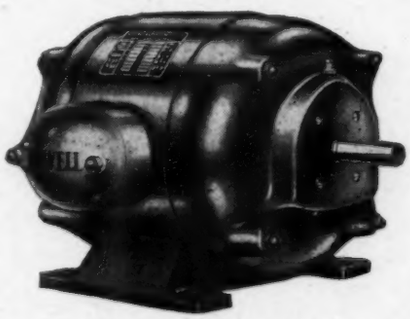
4 **Today**—Progress in harvesting, processing, distribution and the use of specially designed, electrically-driven machinery have upped production and made Canning a major industry.

Now millions enjoy at low cost, foods out of season, vegetables, soups, meat products, and other foodstuffs.

In the Canning Industry, you'll find Howell industrial type electric motors driving conveyors, rotating kettles, operating cookers, fillers, weighing, counting and packaging machines, and cleansing apparatus. You'll find them in all other great industries, too.

If you want motors to operate under gruelling conditions—motors that are precision-built specially for industrial use—buy horsepower by Howell.

Be wise—buy industrial type Howell Motors! They're designed for the toughest tasks in industry; consequently, they perform better on *all jobs!*



Howell Protected Type Motors

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Manufacturers of Quality Industrial Type Motors Since 1915

Here's how Falk Steelflex Couplings completely protect connected machinery

from *Shock...* *Vibration...Misalignment*

Only Falk Steelflex Couplings provide all three: Flexibility, Torsional Resilience* and Applicability to 90% of all industrial requirements.

These three factors are important to the coupling buyer. They offer him positive protection to connected machinery . . . the certain solution to applications where shock loads, misalignment and vibration are problems . . . and the opportunity of stocking one type of coupling to meet practically all of his coupling requirements, quickly and conveniently.

How Falk Steelflex Couplings are designed and produced to provide these factors is important. The diagrams on the opposite page explain how the Falk "grid-groove" design functions to protect machinery against ordinarily damaging conditions . . . how it compensates for parallel and angular misalignment and permits free end float.

A simplified method for selection, load classifications, service factors and dimensions is available to you in a booklet. You are enabled to meet your requirements dependably, quickly —with a reduced parts inventory.

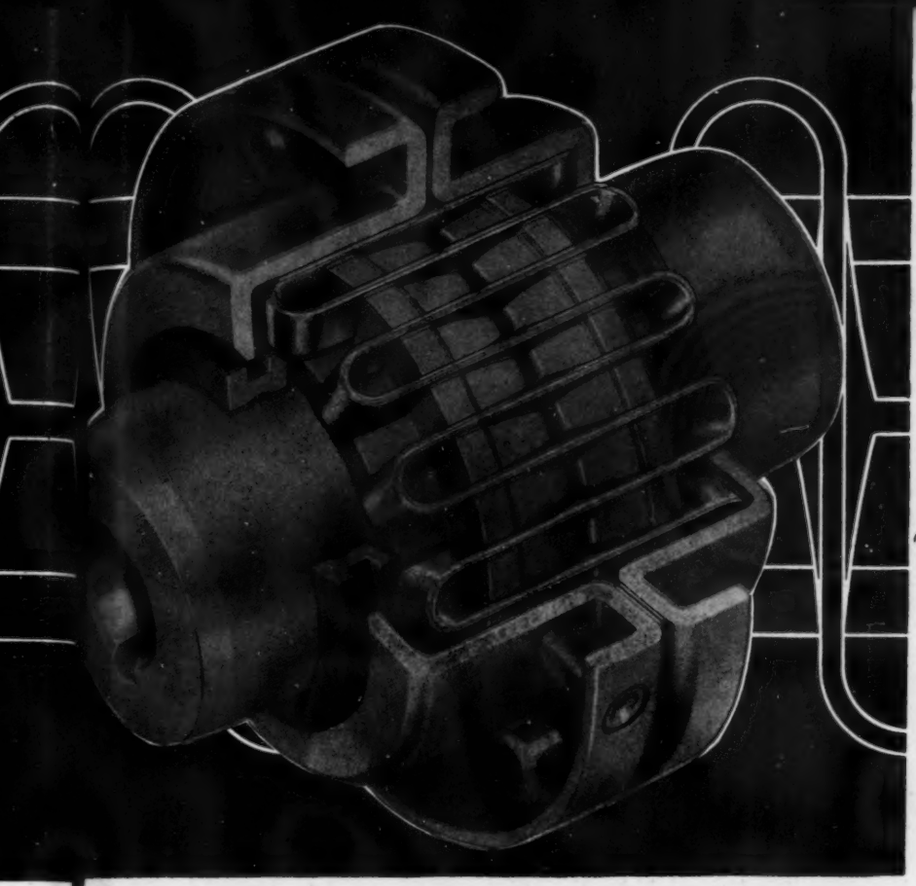
In addition to the standard Type "F" which is applicable to more than 90% of all installations, Falk offers a line of large Steelflex couplings and couplings featuring the Steelflex principle but used for special service and dual-purpose applications.

Get the complete information on Falk Steelflex Couplings either from your Falk representative or distributor, or write to Falk.

*** Torsional Resilience is the ability to spread the peak or shock loads over a relatively long increment of time, thereby greatly reducing stresses in the connected machinery.**

THE FALK CORPORATION
MILWAUKEE 8 WISCONSIN

For over fifty years precision manufacturers of Speed Reducers . . . Motoreducers . . . Flexible Couplings . . . Herringbone and Single Helical Gears . . . Heavy Gear Drives . . . Marine Turbine and Diesel Gear Drives and Clutches . . . Steel Castings . . . Contract Welding and Machine Work. District Offices, Representatives, or Distributors in principal cities.



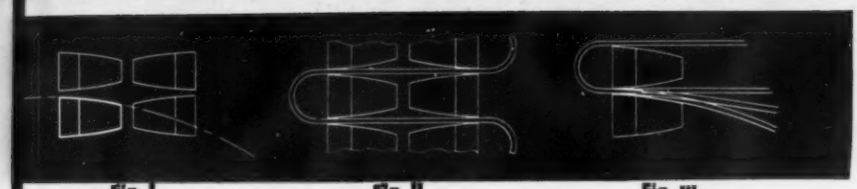


Fig. I Fig. II Fig. III

Fig. I. Grooves, in a precise arc, and with a radius and length proportional to the capacity of the coupling, are cut into two identical hubs of moderately high carbon steel—forged of Falk alloy cast steel . . . Fig. II. These grooves provide a slot for a grid member made of chrome alloy steel with an elastic limit of 180,000 pounds per square inch and an ultimate strength of 220,000 pounds per square inch . . . Fig. III. This grid fits snugly into the curved grooves cut into the hubs of the coupling. The grooves provide a scientifically cut bearing surface for the grid. This bearing surface extends from the outer to the inner edge of the grooves. The grid bears on the grooves in proportion to the load . . .

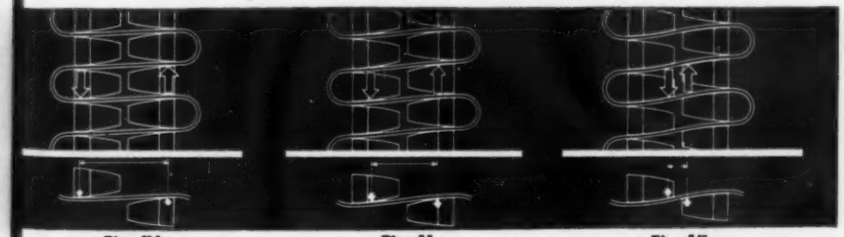
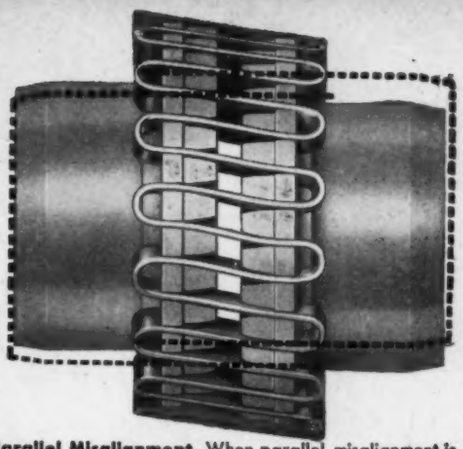
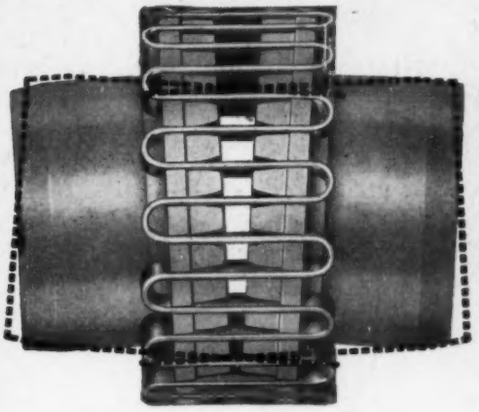


Fig. IV Fig. V Fig. VI

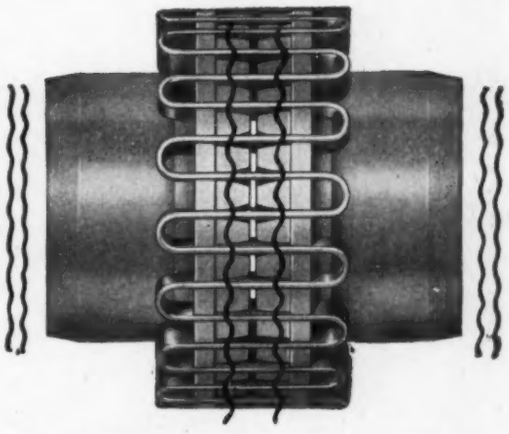
Fig. IV. Under light loads, the grid bears only at the outer edges of the grooves. This permits a long, free, elastic span between the outer edges of both hubs. Power is transmitted through almost the entire length of the grid rung . . . Fig. V. Under normal loads, the grid bears on a larger area of the grid grooves and the span of the grid run is shortened. It transmits more power and maintains its capacity to absorb shocks and dampen vibration . . . Fig. VI. Under peak loads, the grid rungs bear over almost all of the curved surfaces of the grooves. The span of the grid rung becomes very short. Under the impact of shock loads the grid flexes and continues to transmit power smoothly.



Parallel Misalignment. When parallel misalignment is involved, the grid-groove combination comes into full play. The movement of the grid in the lubricated grooves accommodates the misalignment, while still permitting full functioning of the grid-groove action of the coupling in absorbing shock and dampening vibration.



Angular Misalignment. Under angular misalignment the design of the Falk Steelflex Coupling permits a rocking and sliding action of lubricated grid and hubs that allows the greatest freedom of accommodation to angular misalignment, while at the same time transmitting the power through the resilient grid.



Free End Float. Because the grid member slides freely in the lubricated grooves, the Steelflex coupling permits unrestrained end float for the shafts of both the driving and driven members, or of either one. If it is desired that end float be restricted, provision can be made to limit it to any required amount.

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Solving AIR COMPRESSOR TROUBLES

Lubrication Engineer's Report:

"A mining company* in the Joplin area was having trouble with the unloading valve on an Angle Compound Air Compressor. They were also troubled with discharge valve breakage of the high pressure cylinder.

Case No. 1:

"The previous oil was replaced with Cities Service North Star Oil No. 5 and not a single instance of gumming or sticking or trouble of any kind with the unloading valve or discharge valve has been reported in over two years."

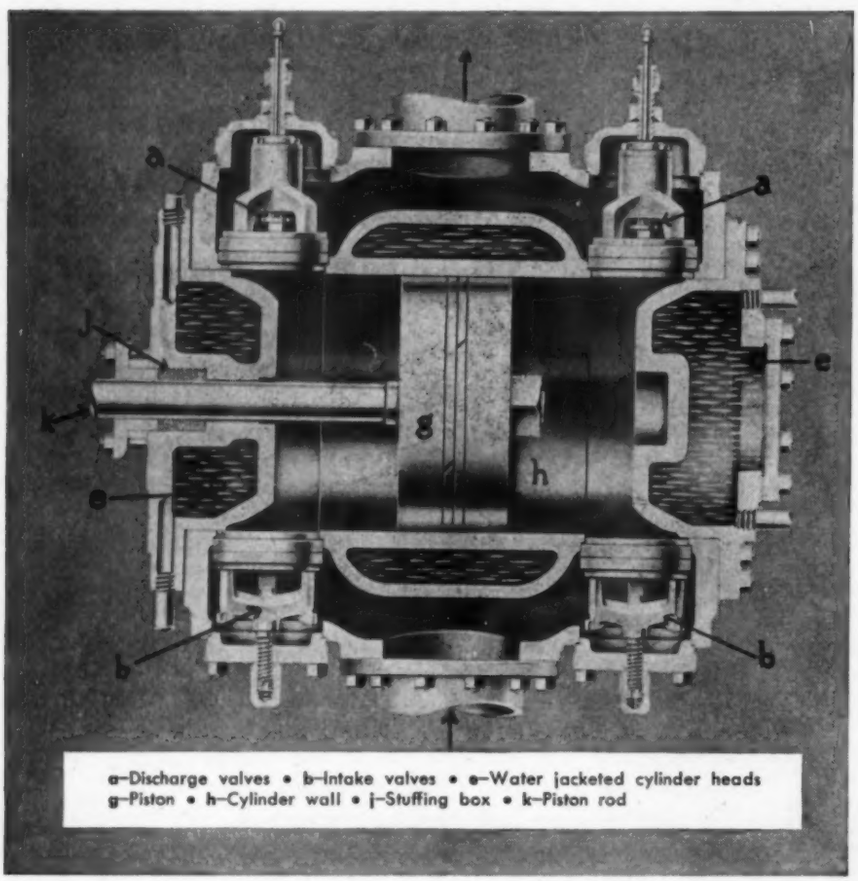
Case No. 2:

"A utility plant* in Springfield, Mo., uses compressed air from a single stage belt-driven air compressor in connection with overhauling jobs of the boilers in their plant. They are all of the water tube type and are overhauled at regular intervals. During these overhauls they need a constant supply of air. The unloading valve of this compressor would gum up to the extent that they would have to clean it about every other day when using a competitor's oil. I sent them a drum of Cities Service North Star Oil No. 5 about a year ago, and checked with their Chief Engineer last month. He tells me they haven't had to clean the unloading valve since putting in the North Star Oil."

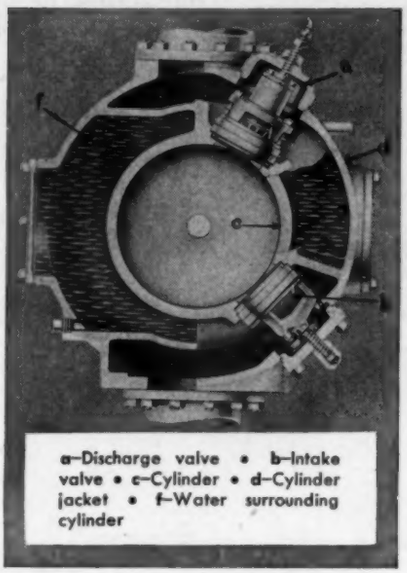
Case No. 3:

"We have lubricated a 1000 cubic foot two-stage air compressor in the Mid-Continent area for over three years. The customer* says that in using Cities Service North Star Oil No. 5 in this compressor he hasn't had any valve breakage and that carbon deposit on valves and seats has been down to practically nothing."

*Names on request.



a–Discharge valves • b–Intake valves • e–Water jacketed cylinder heads g–Piston • h–Cylinder wall • j–Stuffing box • k–Piston rod



a–Discharge valve • b–Intake valve • c–Cylinder • d–Cylinder jacket • f–Water surrounding cylinder

Solving compressor operating problems has been Cities Service's special forte for years. A phone call or card to the Cities Service office nearest you will bring this engineering experience to *your* plant. There is no obligation. For useful information that every air compressor owner and operator should know, write for our free booklet, "Air Compressor Lubrication." Cities Service Oil Co., Sixty Wall Tower, New York 5, N. Y., Room 98.

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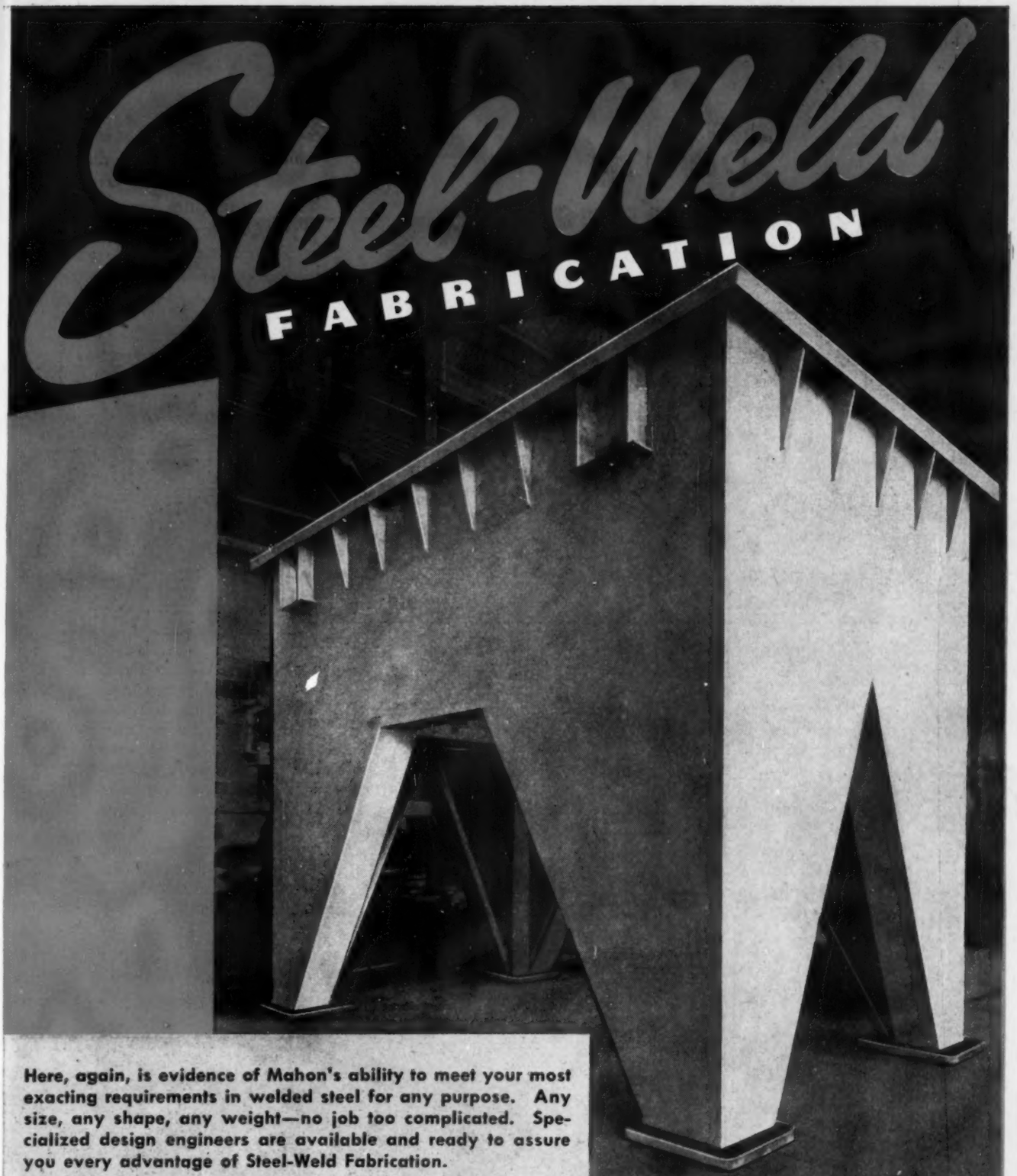

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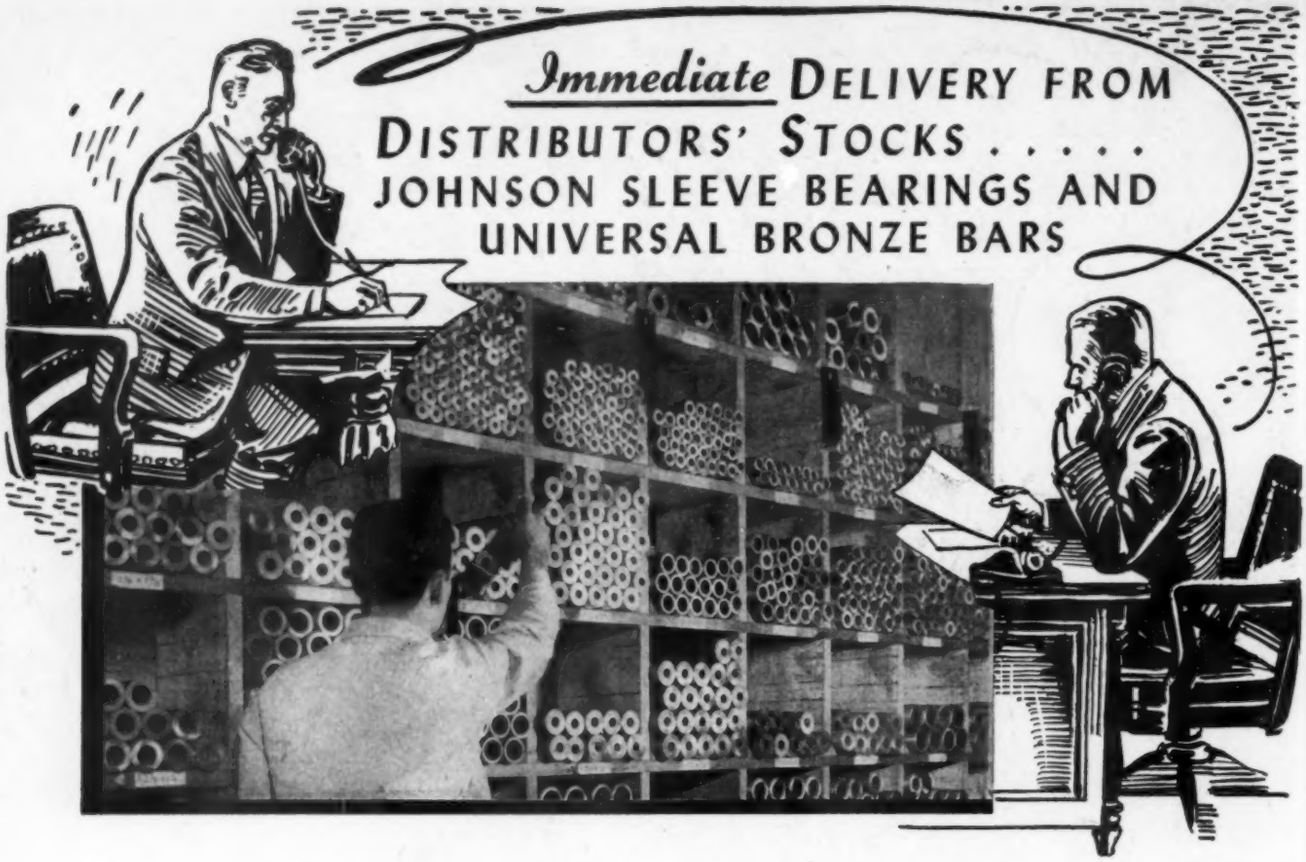

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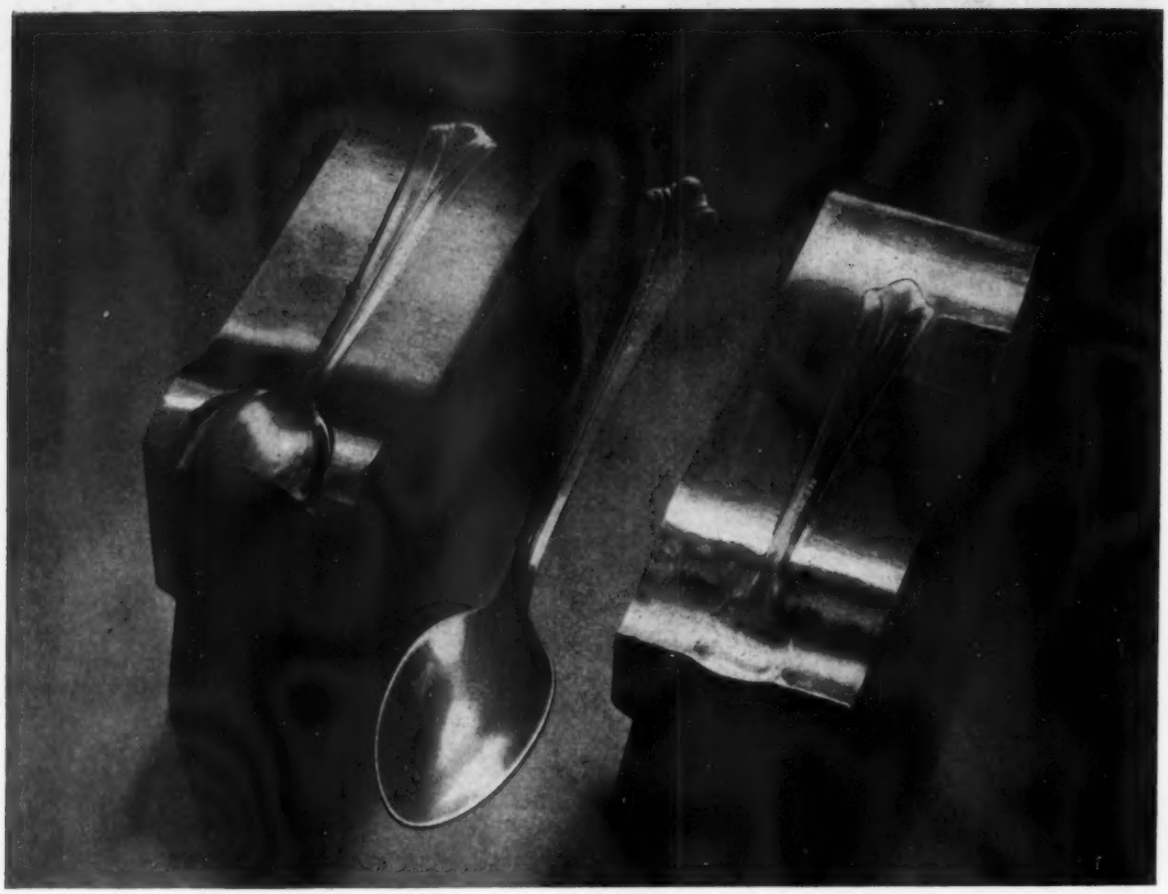

150,000 PIECES OF STAINLESS WARE . . . FROM STRIKING DIES OF XX Carbon Tool Steel

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Deep drawing aluminum alloys? ...use THIO CUTTING OIL

Could you use a drawing oil that eliminates surface scratching, increases production and die life when deep drawing aluminum? If so, you can profit by the experience of the Benson Manufacturing Company, Kansas City, Mo.—makers of aluminum barrels and drums for the brewing, chemical, and oil industries.

Steps in production of the barrels are described at right. The problems encountered are numerous. Dies for the operation are large, complicated and expensive. Long die life is important. Economy demands the securing of good finish on the barrels as they come from the drawing operation without the necessity of grinding or burnishing.

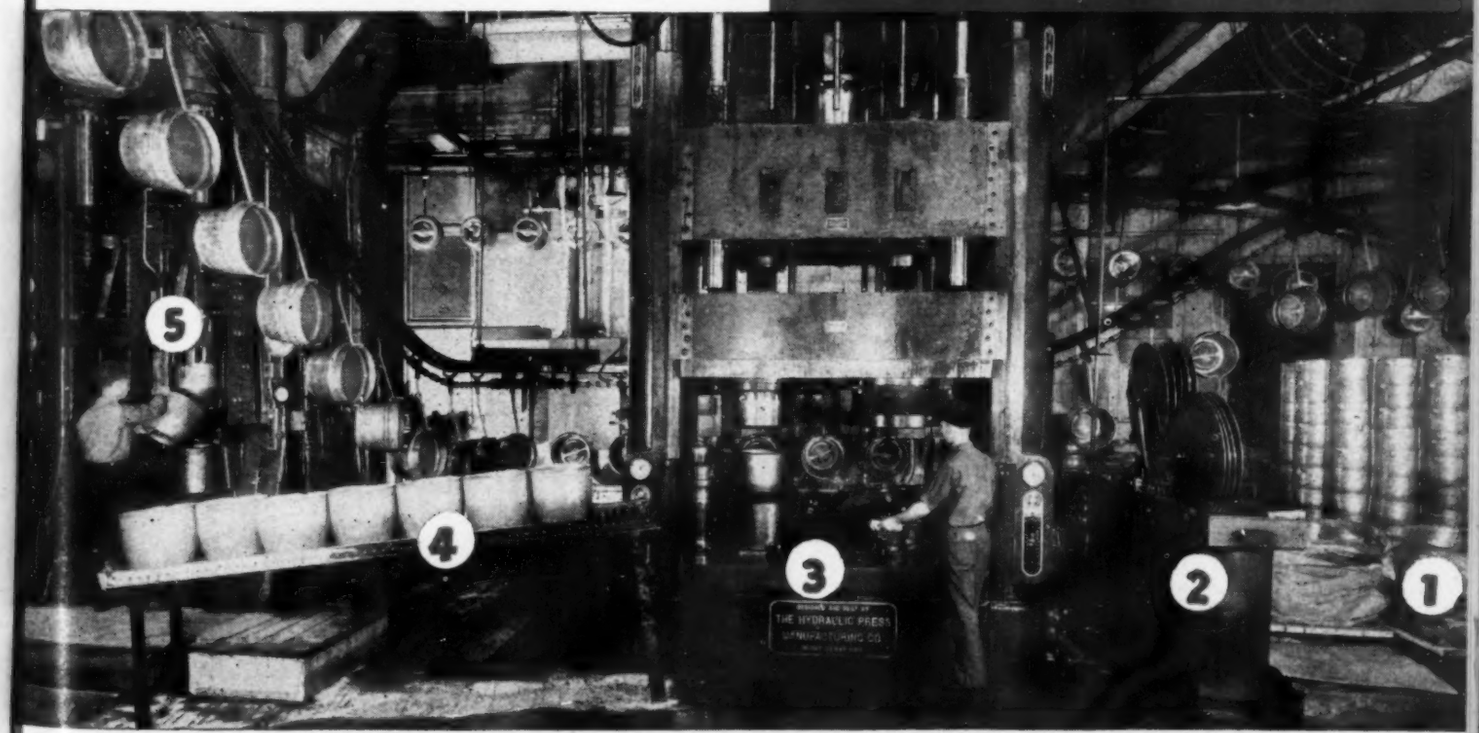
A Standard Oil Lubrication Engineer recommended Thio Cutting Oil—an oil he had used with great success on other aluminum drawing jobs. This oil satisfied all requirements. It gave good die life and finish on a daily output of over 1000 barrels.

Standard Oil Lubrication Engineers are located throughout the Midwest to help you with any drawing, cutting oil or lubrication problem. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you.

Deep-drawing job on aluminum beer barrels.

Material—Aluminum plate—heat-treated alloy—gauge .156.

Operations—Aluminum blanks (**1**) are dipped in tank of Thio Cutting Oil (**2**) and placed in hydraulic press (**3**) where two deep draws are made to form one-half of a barrel (**4**). A second press (**5**) performs the third draw, forming the ends of the barrels. The barrel halves are then beaded, vapor degreased, and welded together and the bung plate is welded on. Because the drawn parts are free from scratches, only a dip finish is required.



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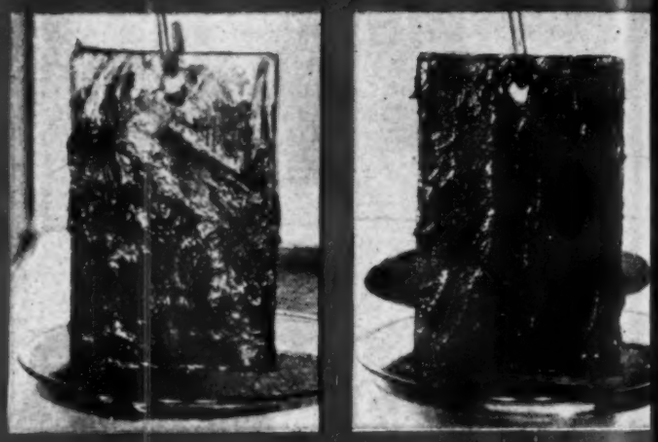
CALUMET Viscous Lubricants

THE SIMPLE TEST described here shows how Calumet Viscous Lubricants reduce lubricant consumption and protect open gears against wear, even though subjected to the direct washing action of water.

Calumet Viscous Lubricants give these advantages because they are compounded from selected soaps and oils of proper viscosities and contain a special additive which makes them adhere closely to metal. They do not require heating before application, and all but the heaviest grades can be sprayed. These application features offer direct savings in time and grease.

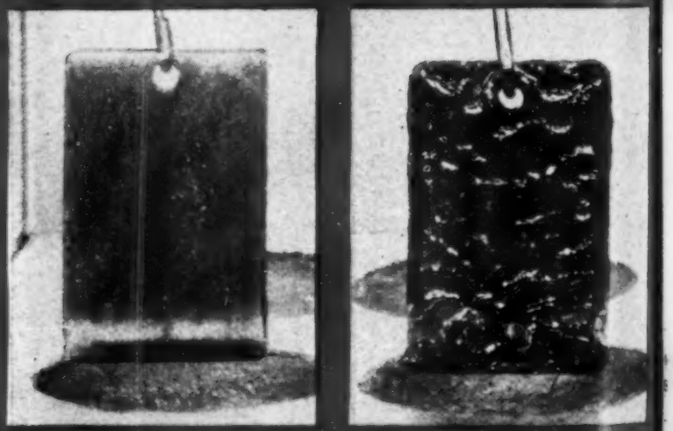
A Standard Oil Lubrication Engineer will help you select the grade you need for low cost open gear lubrication.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.



Test equipment for comparing water resistance of greases. Metal strips are coated with greases to be compared. Left strip—a conventional type soda soap grease. Right strip—a Calumet Viscous Lubricant.

The instrument dips the strips into beakers containing water at 80° F. at the rate of 30 times per minute for 20 hours.



The same test strips after the 20-hour test. The strip containing conventional type soda soap grease is practically bare. The strip holding Calumet Viscous Lubricant is still completely covered.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

HERE THEY ARE

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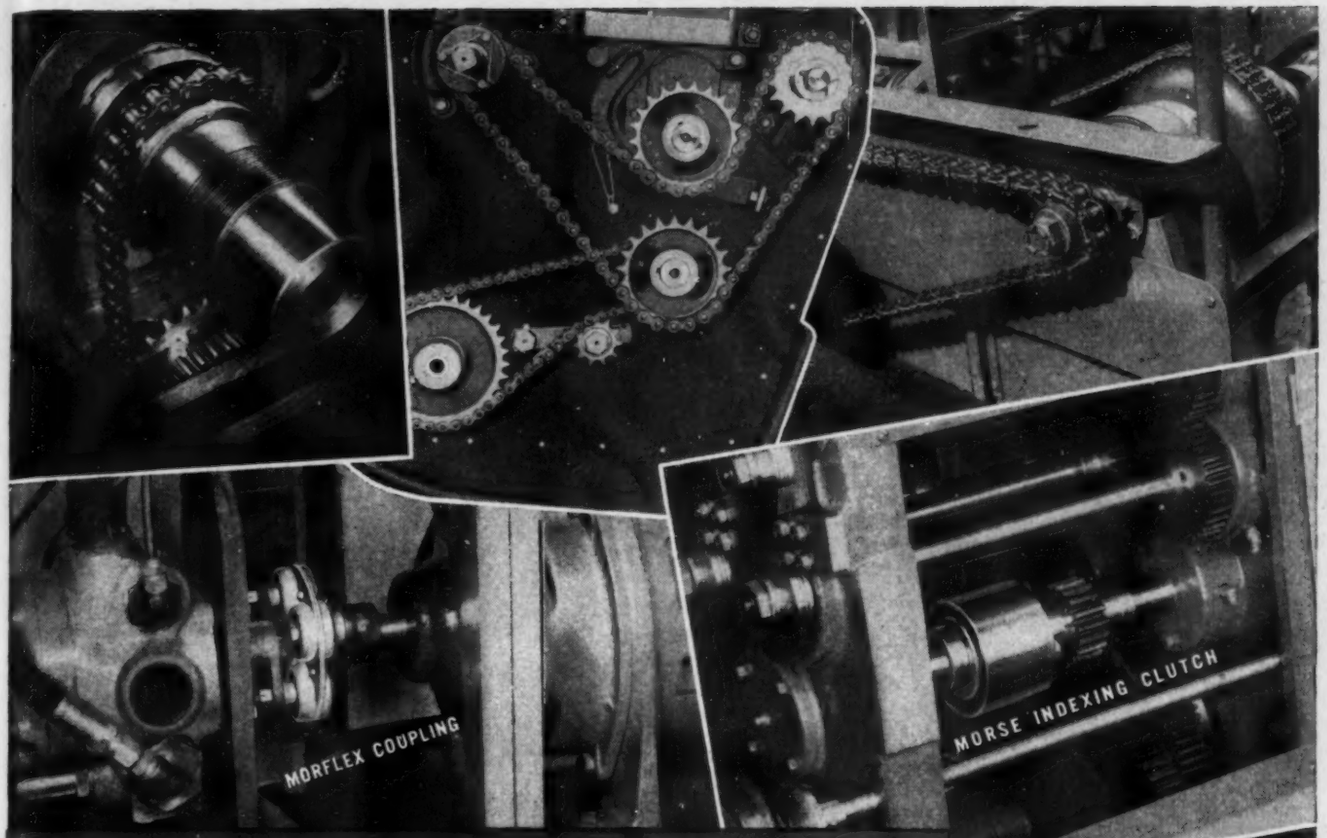

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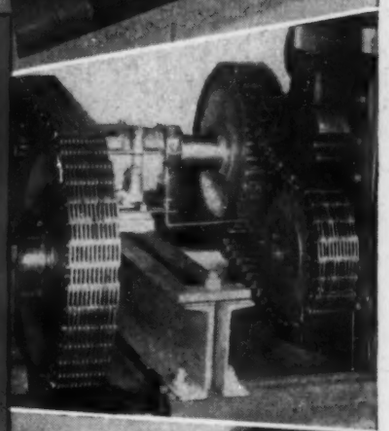

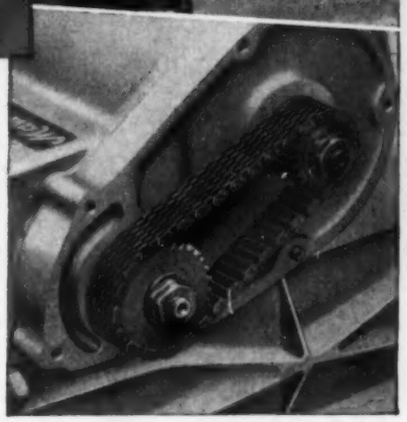

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Bottom gearing of the ladle gearing is a Bijur system. Turning the handwheel actuates the lubricator which forces clean fresh oil to bearings and gears.

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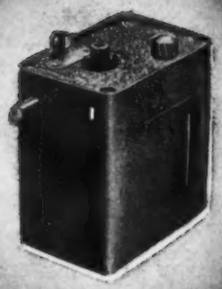
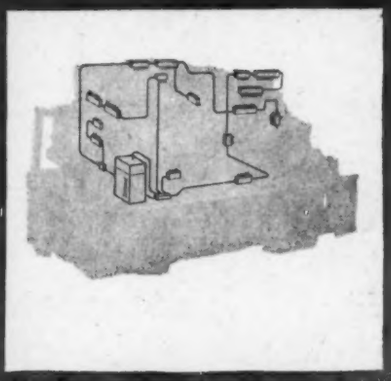


Lubricator type M discharges 3.5 cu cm every 17 hours to oil 98 moving parts.



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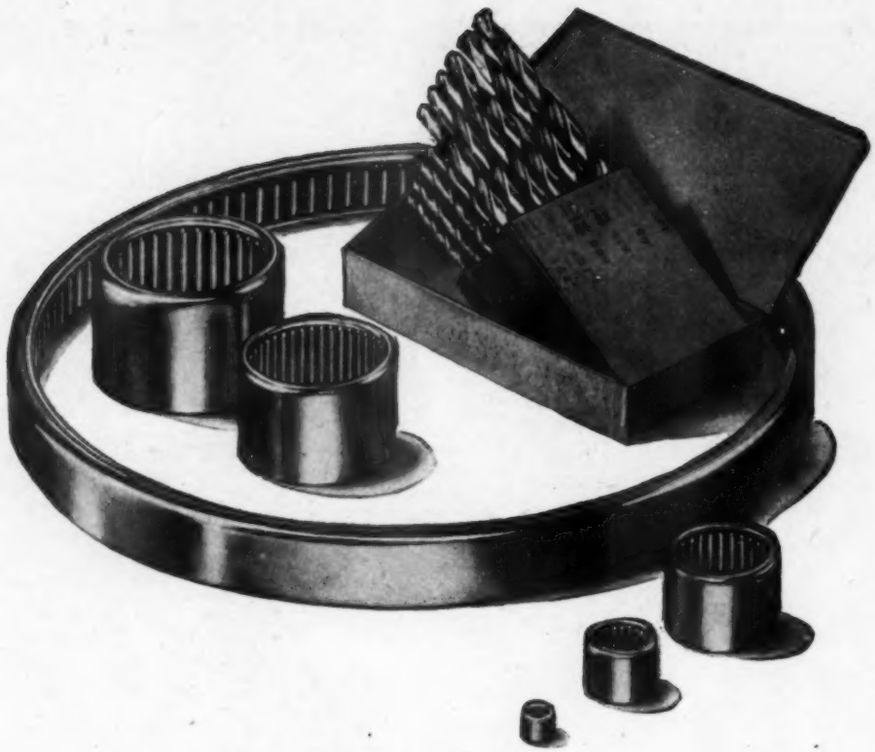

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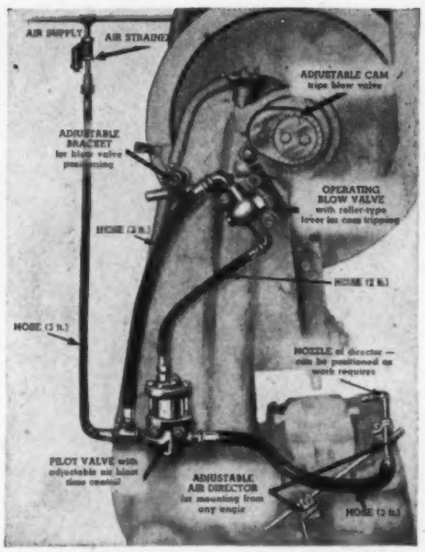

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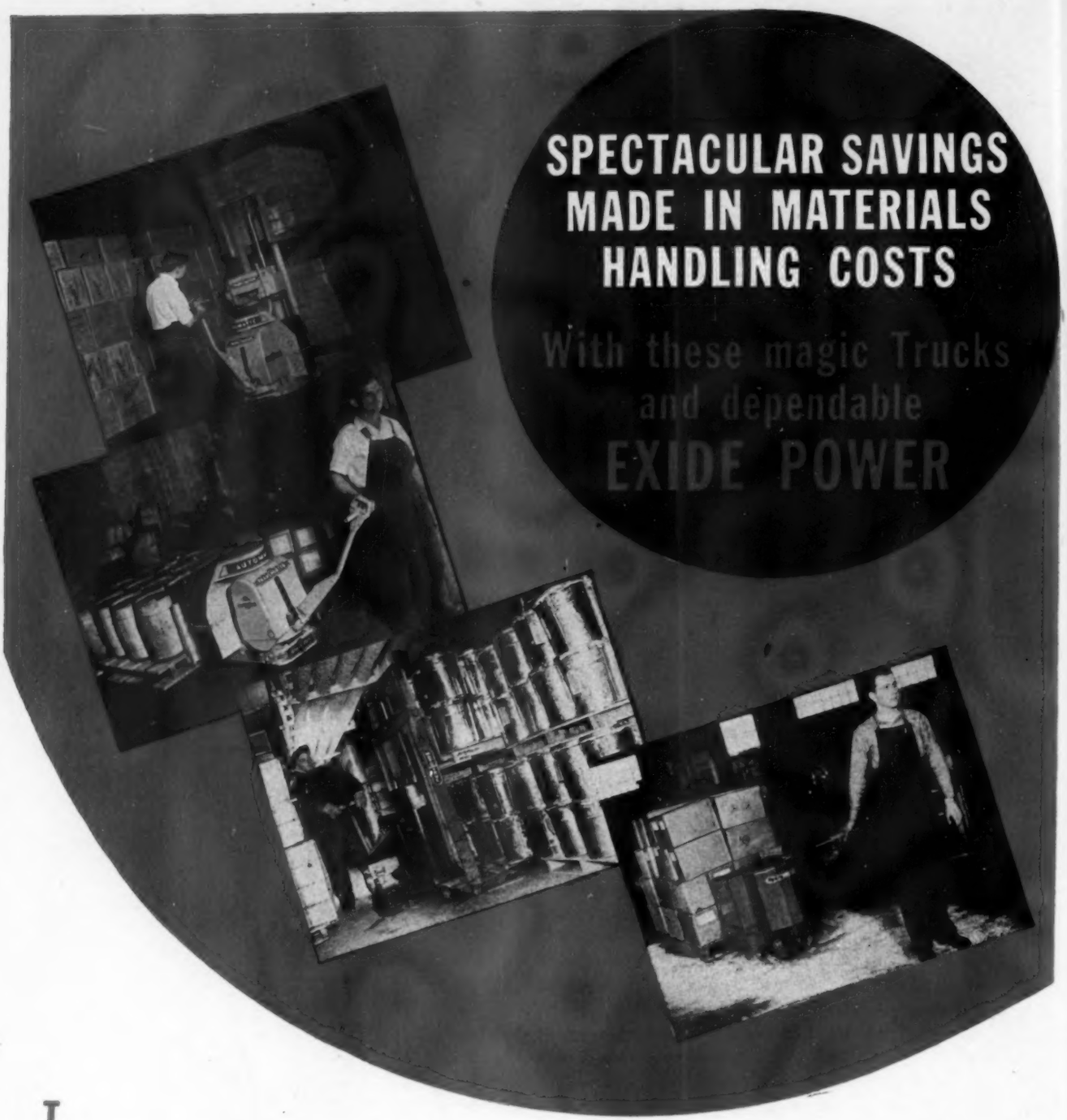

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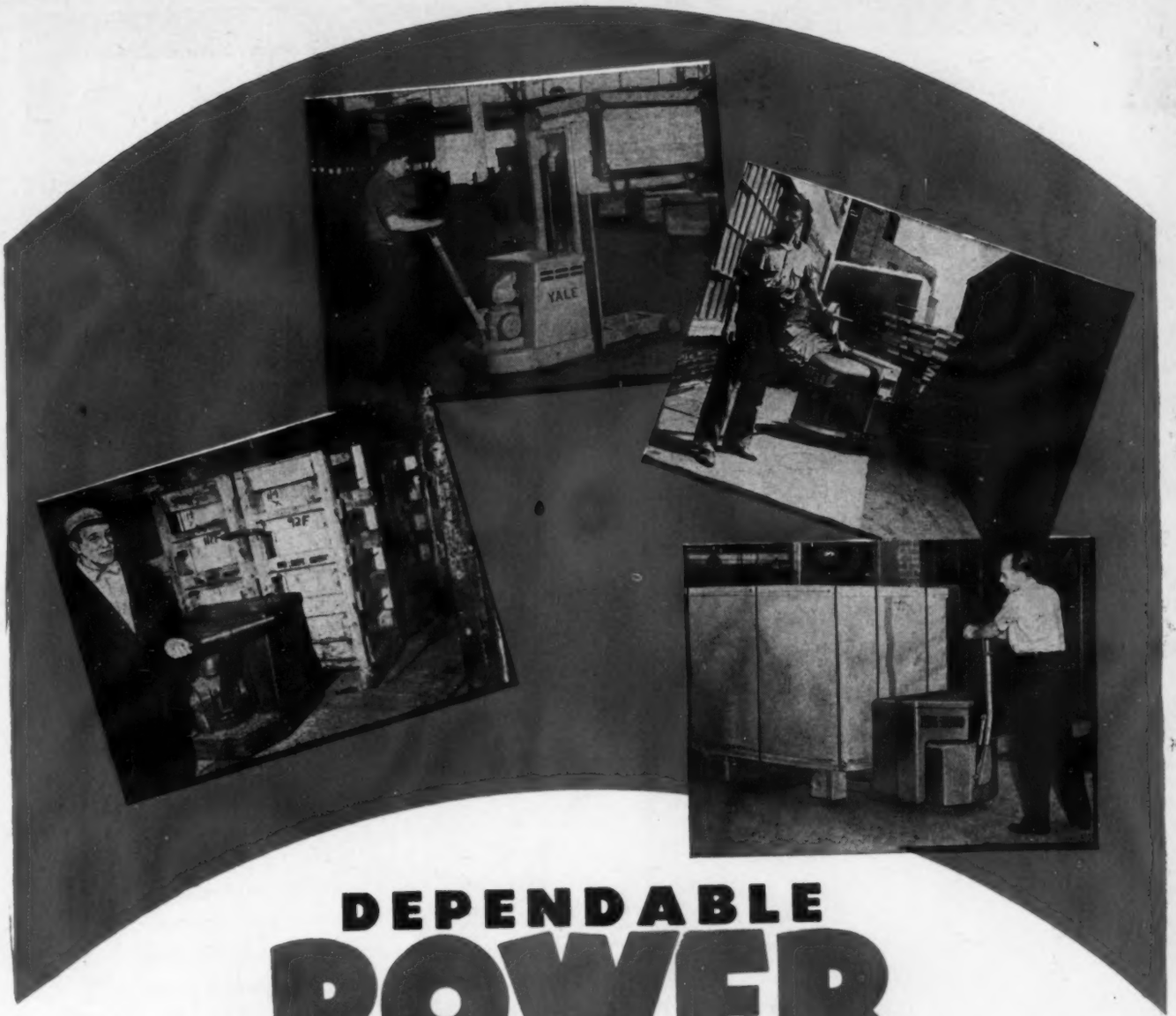


DEPENDABLE POWER

Press Welders with
T-J CYLINDERS

In these air-operated press welders manufactured by The Taylor-Winfield Corp., Warren, Ohio, T-J Cylinders contribute to the rapid and efficient operation of the machines. The cylinder is employed to move the welding head to the work and return—a job performed by T-J with *accuracy, speed* and *dependability!*

This is typical of the widespread use of T-J Cylinders today to simplify operations and save time and labor. There's a T-J Air or Hydraulic Cylinder *exactly right* for all kinds of tough jobs where pushing, pulling or lifting is needed . . . 100 lb. or 50,000 lb. Available in many standard sizes and styles . . . both cushioned and non-cushioned types. Backed by 30 years of know-how . . . T-J engineered to do the job *better* and *cut costs!* Write for latest catalogs. The Tomkins-Johnson Co., Jackson, Mich.

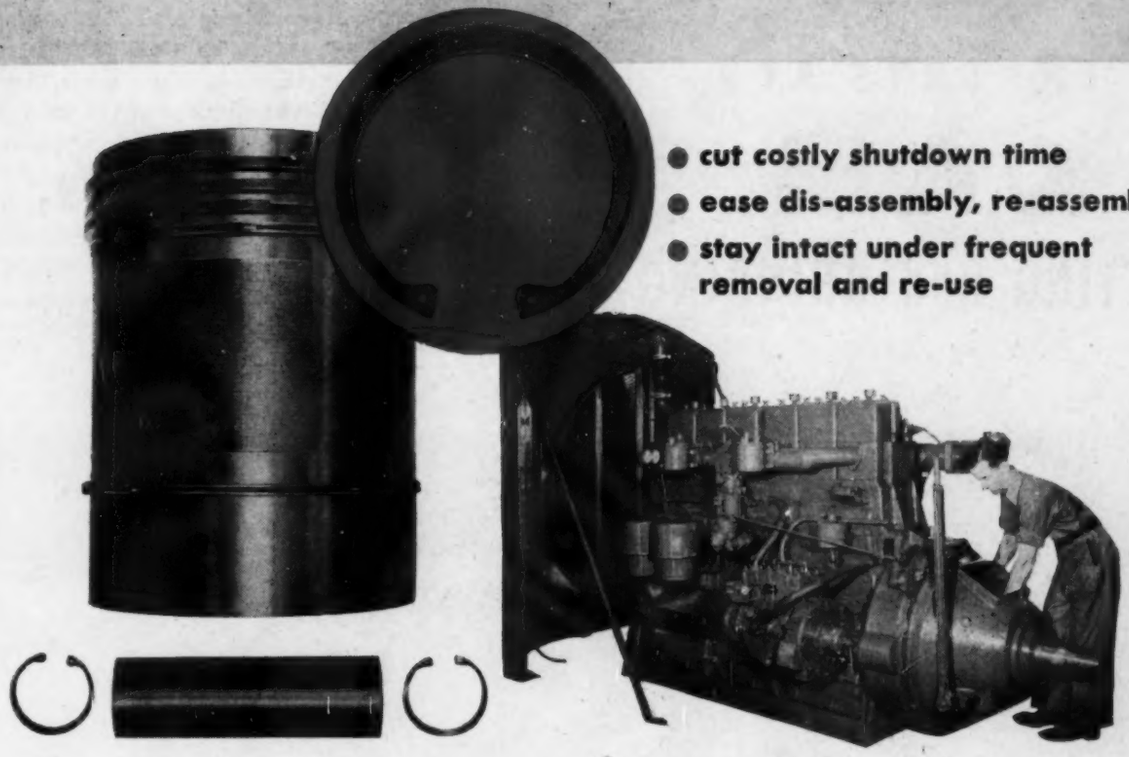
FOR POWER MOVEMENT IN ANY DIRECTION

TOMKINS-JOHNSON

RIVETORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

T-J

TRUARC rings lock piston pins securely for drilling engine on 24-hour service



- cut costly shutdown time
- ease dis-assembly, re-assembly
- stay intact under frequent removal and re-use

After changing to Waldes Truarc Retaining Rings for piston pin retainers in their powerful new Superior 6G-510 oil-field drilling engine, the Superior Engine Division of The National Supply Company finds field maintenance greatly simplified.

Truarc Rings can be easily removed and replaced in a few seconds. They retain both concentricity and flexibility without regard to the number of times they are handled. Other piston pin retainers take a permanent set, delay field repairs, pile up costs.

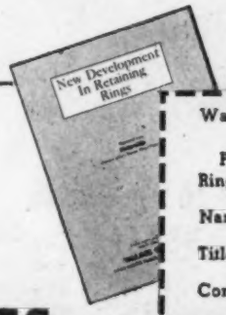
On rocker arms and pumps, on crankshafts and plungers, on a wide variety of applications, Truarc Rings do a better job of holding moving parts together. Designers, production and maintenance men in many industries find Truarc cuts costs sharply wherever used. Its never-failing grip is a superior solution to fastening problems. Its patented design assures constant circularity under all conditions. Send us your drawings: Waldes Truarc engineers will be glad to show how Truarc can help you.

WALDES

TRUARC

U. S. PATENT RE. 18,144

RETAINING RINGS



- *Send for new Truarc booklet, "New Development In Retaining Rings"*

Waldes Kohinoor, Inc., 47-10 Austel Place 12-L
Long Island City 1, N. Y

Please send booklet, "New Development In Retaining Rings" to:

Name_____

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Company_____

Business Address_____

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WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

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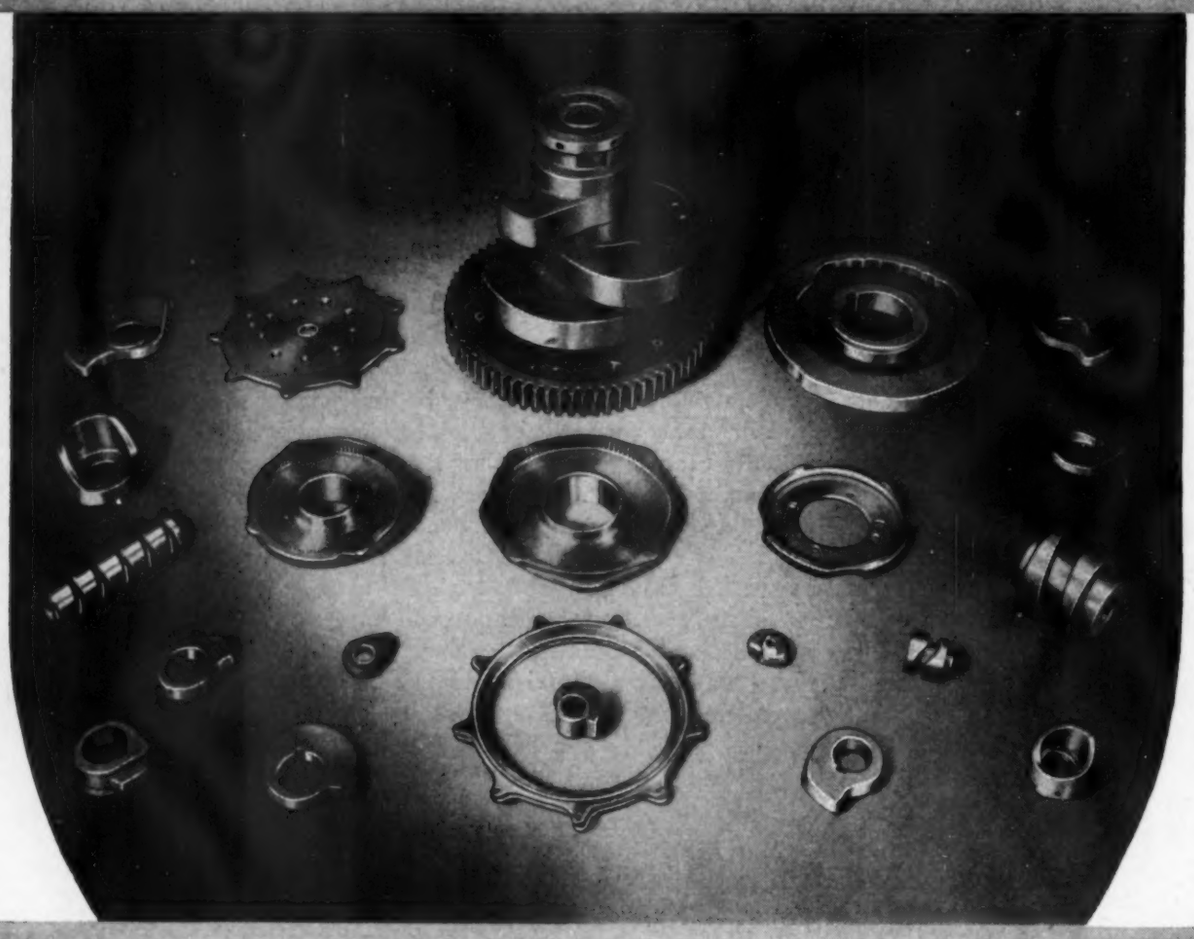
THE LARGEST, most completely equipped plant in the country devoted to CAM cutting and grinding is at your service. 25 YEARS of experience in making special cams for thousands of companies have made us experts at cam cutting and grinding. Our facilities and equipment, finest in the country, permit us to manufacture any style or size Cam, Geneva Motion or Scroll Plate in quantities of 1, 10 or 10,000. Accuracy can be maintained to split thousandths, and surfaces to micro-finishes. Send us specifications or blueprints and we will be glad to submit a detailed quotation on your requirements.



KUX MACHINE COMPANY

3922 W. HARRISON STREET • CHICAGO 24, ILLINOIS

Don't Lubricate until 1952

Says

Electric Machinery Mfg. Co. of Minneapolis, Minn., another user of Norma-Hoffmann's Patented "Cartridge" Bearings

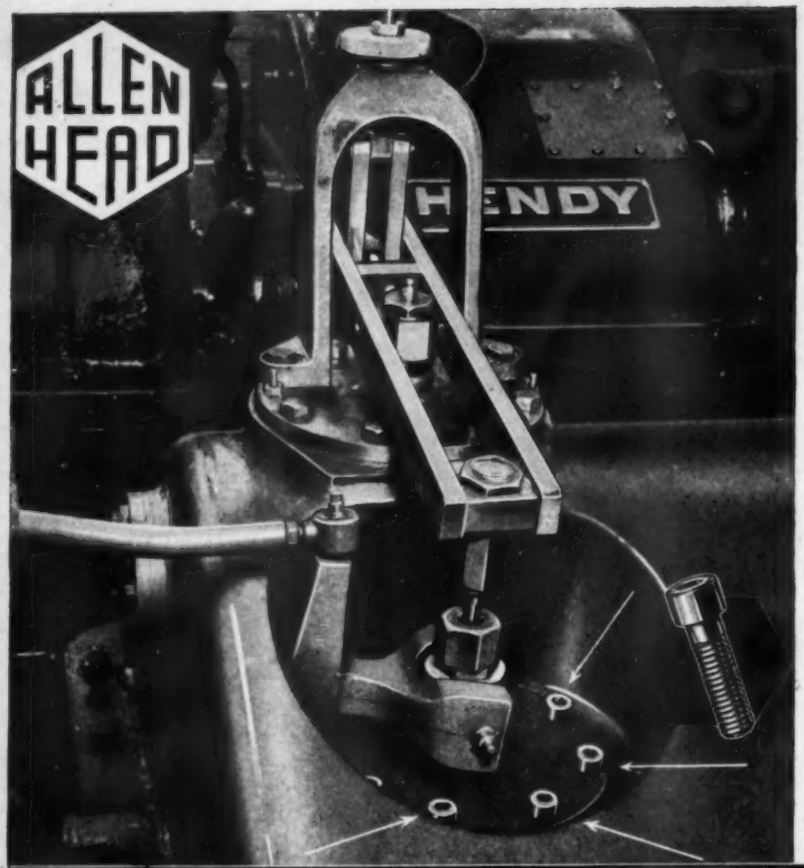
The new "Regulectric" generators need no adjustments, no maintenance, no attention for years and one reason is—

. . . the bearings are sealed as effectively as are the components of the built-in regulating circuit.

Made to double-row width, these "Cartridge" Bearings have 100% more grease capacity than any other standard self-sealed type and they also permit added shaft strength and reduced overhang. Write for all the facts on Norma-Hoffmann's "Cartridge" Bearings.

NORMA-HOFFMANN
***Precision* BEARINGS**
BALL • ROLLER • THRUST

NORMA-HOFFMANN BEARINGS CORPORATION
STAMFORD, CONNECTICUT
FIELD OFFICES: New York, Chicago, Cleveland, Detroit, Pittsburgh, Cincinnati, Los Angeles, San Francisco, Seattle, Phoenix



ALLEN

SOCKET HEAD CAP SCREWS

— as used in the governor assembly of turbo-generator set, 500-kw. unit built by Joshua HENDY Iron Works, Sunnyvale, Calif.

In the governor mechanism, in a special sense, the *controlling* factor is integrity of the assembly and DEPENDABILITY of its components. In this place of responsibility are ALLEN Socket Head Cap Screws, — and in *other* important places in the power unit.

"Allens" have the HOLDING-POWER because they have the strength for powerful set-ups. Their strength is gained by *"pressur-forming"* of special-analysis *ALLENOY* steel, which makes the steel fibres conform to the shape of the screw head. In the perfectly-formed hex sockets, the keys bear evenly and equally on all surfaces. Threads also are *"pressur-formd"* to a high Class 3 fit, for high-friction hold in tapped hole.

Order of your local Industrial Distributor.

The Allen Mfg. Company ★ ALLEN ★ Hartford, Conn., U. S. A.

VALVAIR WON'T LEAK AFTER *Millions* OF OPERATIONS!

Diagram shows double-acting air cylinder operated by Valvair lever-operated 4-way valve.

Sensational performance? Perhaps; certainly thoroughly proven, thoroughly dependable; over 2,000,000 operations at 100 lbs. pressure and still going strong. Non-corrosive—cast bronze body, stainless steel parts; no metal seats to cause trouble; full pipe area utilized with minimum pressure drop. *A Valvair for every need:* 3 types, 8 designs, 5 sizes (⅛" to 1").

Exclusive Features

Ask for Bulletin AA or a Valvair rep...

VALVAIR CORPORATION • 454 Morgan Avenue, Akron 11, Ohio

Valvair

BULL'S-EYE EVERY TIME

... SPECIFY "ABBOTT" BEARING BALLS

THE ABBOTT BALL COMPANY HARTFORD, CONN. U.S.A.

INCREASED PRODUCTION
IS ONE THING
CUTTING PRODUCTION COSTS
IS ANOTHER

HANSEN
COUPLINGS
DO BOTH

Connections and change-overs become a matter of seconds when you use Hansen Couplings. That means time and money saved with no hold-up of costly operations.

Hansen couplings are toughly constructed for hard abuse, yet carefully and simply designed for finger-tip control. Merely insert plug in socket and coupling is connected; a slight pull on the sleeve and it is disconnected. No twisting or manipulating of parts, no leakage. Complete swivel action prevents kinking of hose. Made for air, oil, grease, oxygen and acetylene to handle pressures from ounces to 10,000 pounds.

Write for folder describing
Hansen couplings for industrial uses.

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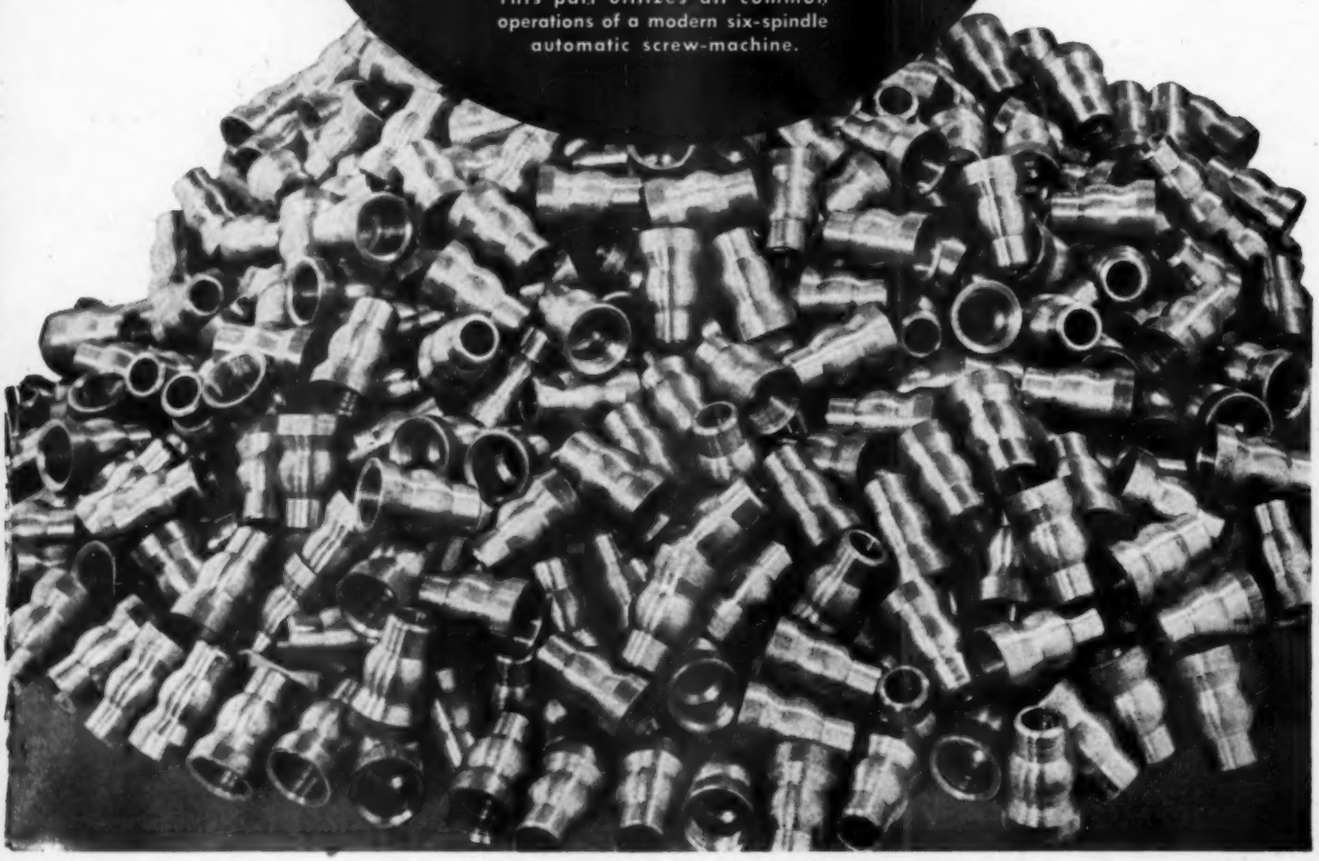
1786 EAST 27th STREET • CLEVELAND 14, OHIO

Useless Parts

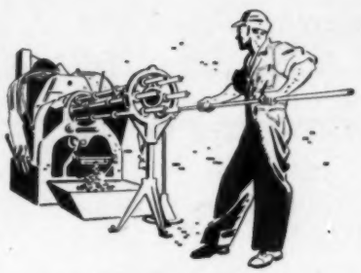
This part utilizes all common operations of a modern six-spindle automatic screw-machine.



WITH A USEFUL PURPOSE

—to give you better

MACHINABILITY



Millions of these little steel parts have been made during the past 17 years on modern automatic screw machines in the Republic Union Drawn plant at Massillon. And even though not a single one can be used for a practical application, every part has served a very useful purpose.

They are standard test parts—specially designed to incorporate all common machining operations on an "automatic".

In producing them, tons of steel of all standard and many experimental analyses have been cut up by an experienced operator under actual shop conditions. Various speeds and feeds have been employed and records carefully kept of the behavior of the steel, surface finish, tool life and production time.

During all these tests, Republic metallurgists and engineers have made an intensive study of the records to learn more about the machining characteristics of steel—with these results:

1. Substantial improvement made time after time in the machinability of Republic Union Cold Drawn Steels.
2. The development of new free-machining steels.
3. The helpful tables of recommended speeds and feeds in the Union Drawn Steel Handbook.
4. Assistance given to hundreds of parts producers by Union Drawn Field Men.

This full knowledge of the behavior of cold drawn steels as they are used under all conditions in actual plant production is one of the reasons why Republic Cold Drawn Steels are "out front" in *MACHINABILITY* today—why Union Drawn metallurgists and engineers frequently can help you improve quality, step up production efficiency and cut unit costs.

REPUBLIC STEEL CORPORATION
Union Drawn Steel Division • *Massillon, Ohio*
GENERAL OFFICES • **CLEVELAND 1, OHIO**
Export Department: Chrysler Building, New York 17, New York

Republic

REPUBLIC STEEL REG. U. S. PAT. OFF.

US

UNION COLD DRAWN STEELS

Free-Machining Bessemer, Alloy and Enduro Stainless Steels

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Union Cold Drawn Special Sections

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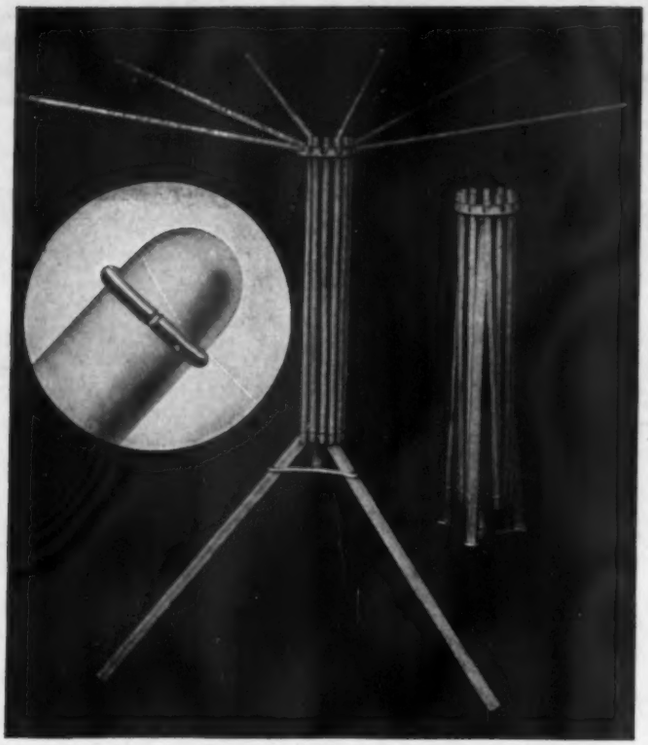
Union Cold Drawn and Ground Rounds; Turned and Polished Rounds; and Turned, Ground and Polished Rounds (Union Precision Shafting)



ANOTHER PROFITABLE USE OF NATIONAL RETAINING RINGS

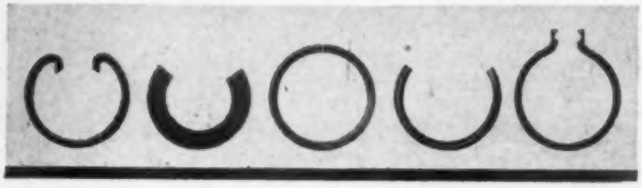
On both ends of each of the 12 wooden dowels are soft retaining rings that form stops both for open and closed positions.

Economical and efficient—the Artmoore Co. "New Art Tripod—Collapsible Dryer" is a godsend—a real convenience on ironing day and for "in-between" washings.

Examine your products and machines to find out where these modern inexpensive artificial shoulders can save money and metal or both.

Write today for descriptive folders on many types of retaining rings.

THE NATIONAL LOCK WASHER COMPANY
NEWARK 5, NEW JERSEY MILWAUKEE 2, WISCONSIN



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Cutting to length, Heat treating, Forging. Testing, Turning, Special Finishes. Prompt shipment of rounds, squares, flats, hexagons, octagons, and billets. Technical information and recommendations.

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Precision Jig-Welded from *Pre-Formed Parts*
Completely replacing heavy castings, Fab-Welded Machine Frames and Bases of intricate design are built up from accurately made parts, jig-welded, and produced on a quantity basis . . . reducing machining costs, rejects, handling and freight costs.
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You Can SEE That

It's ONLY the SIDE of a V-Belt

That Grips the Pulley and *Gets the Wear!*

DIAGRAM OF BELT IN PULLEY GROOVE

Look at a V-Belt in its sheave and you see at once that the *sides* of the belt do all the gripping on the pulley and get all the wear against the sheave-groove wall.

Notice, too—it's the *sides* that pick up all the power delivered by the driver pulley. The sides *transmit* that power to the *belt as a whole*. And then, once more, it's the sides—and the sides *alone*—that grip the driven pulley and *deliver* the power to it.

That is why you have always noticed that the sidewall of the ordinary V-Belt is the part that wears out first.

—*and Here Is How the* CONCAVE SIDE ★REDUCES Sidewall WEAR *and Lengthens Belt Life!*

Clearly, since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the *middle* of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belts can possibly give.

Straight Sided V-Belt

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley

No Bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

★More Important NOW That STRONGER Tension Members are Used

Now that Gates *Specialized* Research has resulted in V-Belts having much stronger tension members—tension members of Rayon Cords and Flexible Steel Cables, among others—the sidewall of the belt is often called upon to transmit to the pulley much heavier loads. Naturally, with heavier loading on the sidewall the life-prolonging Concave Side is more important today than ever before!

THE GATES RUBBER COMPANY Denver, U. S. A.

"World's Largest Maker of V-Belts"

473

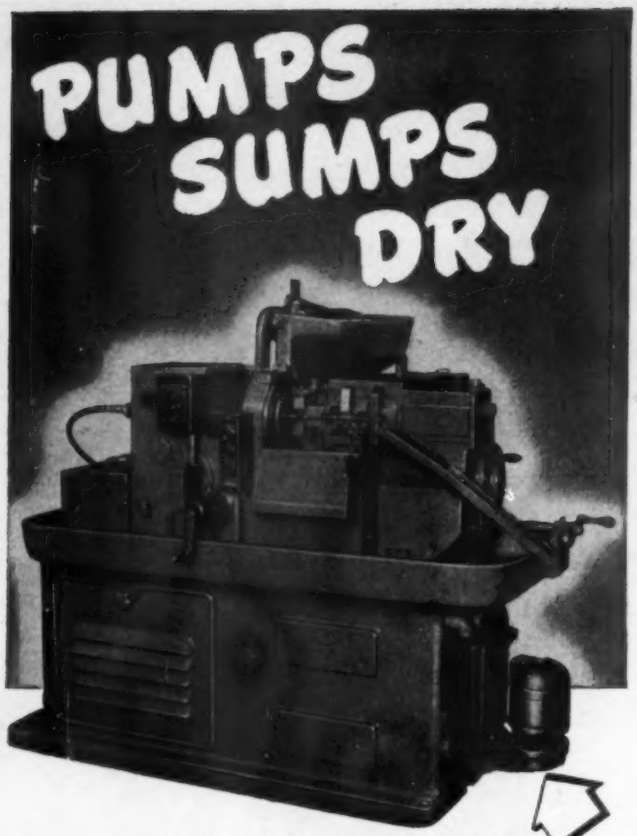
GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

Gates

THE MARK OF SPECIALIZED RESEARCH

PUMPS SUMPS DRY



The compact design of this Pioneer Coolant Pump, Model VBA, allows it to be installed in sumps, or pans, that are practically flush with the floor . . . designed to get the most out of a restricted or small sump base, it will empty the sump to the very bottom . . . efficiently handles coolants containing large chips or shavings . . . standard models available in capacities of 13-148 gallons per minute.

PIONEER MODEL VBA

...THE ONLY PUMP FOR SHALLOW SUMPS

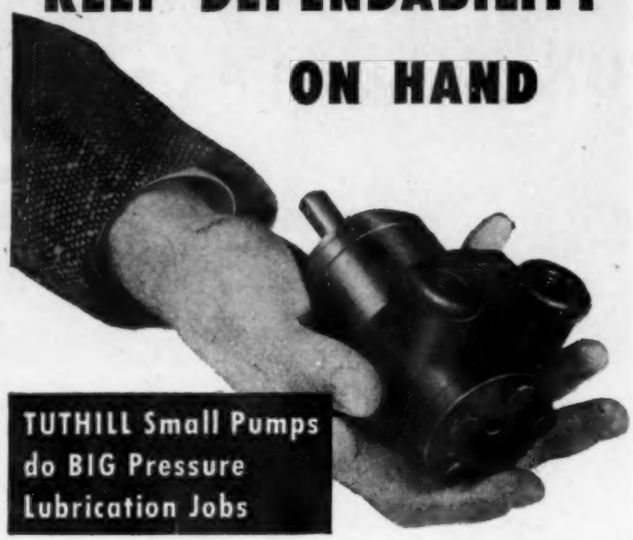
400 MODELS

FOR LUBRICANTS AND COOLANTS

Pioneer Pumps in Seal-type, Seal-less and Rollway designs for pumping coolants, cutting fluids, abrasive liquids, lubricants and water available in every desired type and size. Please specify your needs when writing for information.

Pioneer Pump & Manufacturing Co.
19651 JOHN R ST. • DETROIT 3, MICHIGAN

KEEP DEPENDABILITY ON HAND



TUTHILL Small Pumps do BIG Pressure Lubrication Jobs

For all its small size, the Tuthill Model L pump does a whale of a job in pressure lubrication and hydraulic service. This internal-gear rotary pump is mechanically sealed and built in capacities up to 3 g.p.m. in pressure ranges up to 400 p.s.i. Ring or foot mounting. Many porting arrangements. Write for bulletin on Tuthill small industrial pumps.

TUTHILL PUMP COMPANY
939 East 95th Street, Chicago 19, Illinois

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ARE YOUR COSTS IN SHAPE FOR A BUYER'S MARKET?

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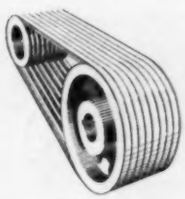
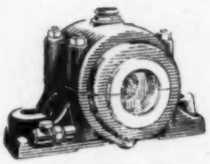


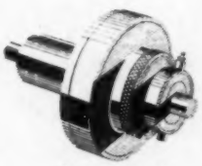
V-belt Drives

Anti-Friction Bearings

DODGE
OF MISHAWAKA, INDIANA



Babbitted Bearings



Friction Clutches

Steel Pulleys

Costs can be cut... machine performance improved... greater production obtained... through the correct application of *your power to your job.*

Call the Transmissioneer. He has the facts about new developments by Dodge of Mishawaka—products that can cut costs and help keep production rolling profitably. In the fields, on the sea, in the air, and beneath the earth, as well as in the mills and factories, Dodge power transmission equipment is contributing greatly to the production miracles which are now the commonly accepted achievements of American industry.

Graduate of an intensive factory course, the Transmissioneer is a specialist in applying power to the job. He is qualified to analyze the problems of power transmission in your plant, or as applied to your product. He's prepared to recommend correct equipment. Call him in, without obligation, to discuss your needs. You'll find him listed under "Power Transmission" in the classified phone directory.

DODGE MANUFACTURING CORPORATION, MISHAWAKA, INDIANA

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NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY,
ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

Mac-it ALLOY STEEL SCREWS

GREATER STRENGTH
where you want it, with
HOLLOW SET SCREWS!

Mac-it Hollow Set Screws will solve your toughest holding-down problems where flush surfaces, compact construction and a neat appearance are factors. *All* Mac-it screws are heat-treated and accurately made with die-cut threads. Whatever your needs, let the *complete* Mac-it line serve you. Sold through recognized distributors from coast to coast and in Canada.

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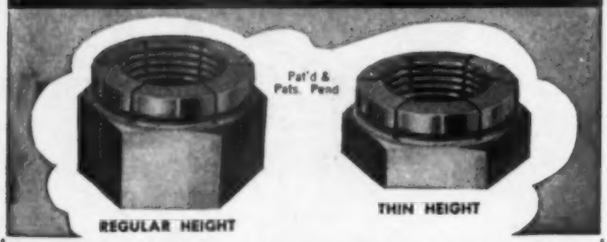
FLEXLOC



SELF-LOCKING NUTS

CAN YOU BE SURE THAT A PLAIN NUT WON'T SLYLY UNWIND ITSELF? If not, then what you need is the All-metal, One-piece "Flexloc," which is a Self-Locking Nut that won't budge, except when a wrench is used.

"Flexloc" packs maximum usefulness in minimum space because it is rugged, locked, compact—and is therefore, becoming increasingly popular and this applies alike to U.S.S. and S.A.E. thread series. Every thread—including the locking threads—takes its share of the load.

Covers a wide range of tolerances—from low #1 to high #3. Can be used over and over again without losing much of its locking ability.

Being a "stop" nut, it stays locked in any position on a threaded member.

"Flexloc" Thin Nuts are especially popular, because their tensile is so high.

Sizes from #6 to 1" in diameter—millions in use!

Convince yourself with a few free samples

OVER 43 YEARS IN BUSINESS
STANDARD PRESSED STEEL CO.
JENKINTOWN, PA. BOX 4
BOSTON • CHICAGO • DETROIT • INDIANAPOLIS • ST. LOUIS • SAN FRANCISCO

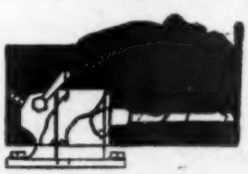
Cut Costs with MEAD
MIDGET AIR CLAMPS

Horizontal and Vertical!

Both models deliver 80 lbs. pressure on a line pressure of 100 lbs. They'll save countless man-hours in assembly operations involving welding, riveting, bolting, etc. *Advantages over mechanical clamps:*

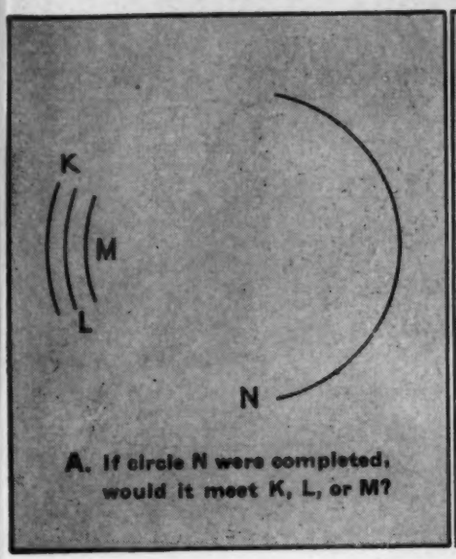
1. Any number can be operated by single master valve. 2. Easily installed in cramped corners. 3. Equal ram pressure at any stroke point.

Send for new Mead AIR POWER Catalog, describing our line of Air Clamps, Air Vises, Air Presses, Work Feeders, Valves, Controls, etc.

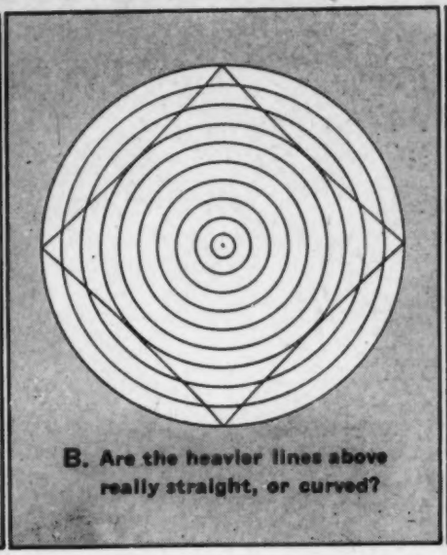


MEAD SPECIALTIES COMPANY
4114 NORTH KNOX AVENUE
DEPT. MA-37 • CHICAGO 41, ILLINOIS

Can You Always Believe Your Eyes?



A. If circle N were completed, would it meet K, L, or M?



B. Are the heavier lines above really straight, or curved?

C. What size is this Socket Screw?

Some things aren't always what they seem to be – even to experienced eyes. The size and thread pitch of the socket screw above, for example, were guessed wrong by many of the shop men questioned in a recent test. On the job, that means they must take *time out* to *find out*.

There isn't any question...

WHEN IT'S SIZE-MARKED

Any assembly worker can spot the right size without effort – no need to waste time – no need to guess and risk errors. The correct size is clearly marked on the head.

At the tool-crib, left-over, mixed-up screws are quickly sorted and put back in the proper bins, without slow "miking" or gauging.

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Gear Grip makes Size-Marked Screws slip-proof, even when fingers are oily. Only Parker-Kalon offers Socket Head Cap Screws with both features. Write for samples, today. Parker-Kalon Corporation, 200 Varick Street, New York 14, New York.

ANSWERS

A. N and M are arcs of the same circle.
B. The lines are curved.
C. When it's P-K Size-Marked, there's no question!

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Turns profiles, multi-diameters and tapers at one pass of the box. For use on capstan and automatic lathes. Eliminates use of two or more roller boxes or forming tools, thereby leaving open extra turret and cross slide stations for use on other operations. Saves up to 80% machining time. Widely used during peak war-time production by such famous English firms as Hawker Aircraft, Rolls-Royce, Vickers-Armstrong, etc. Inquiries invited from qualified dealers and sales agents. *Write to us today for information and illustrated literature at Dept.* AM-3A.

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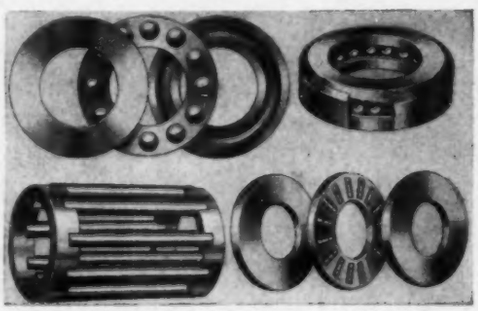

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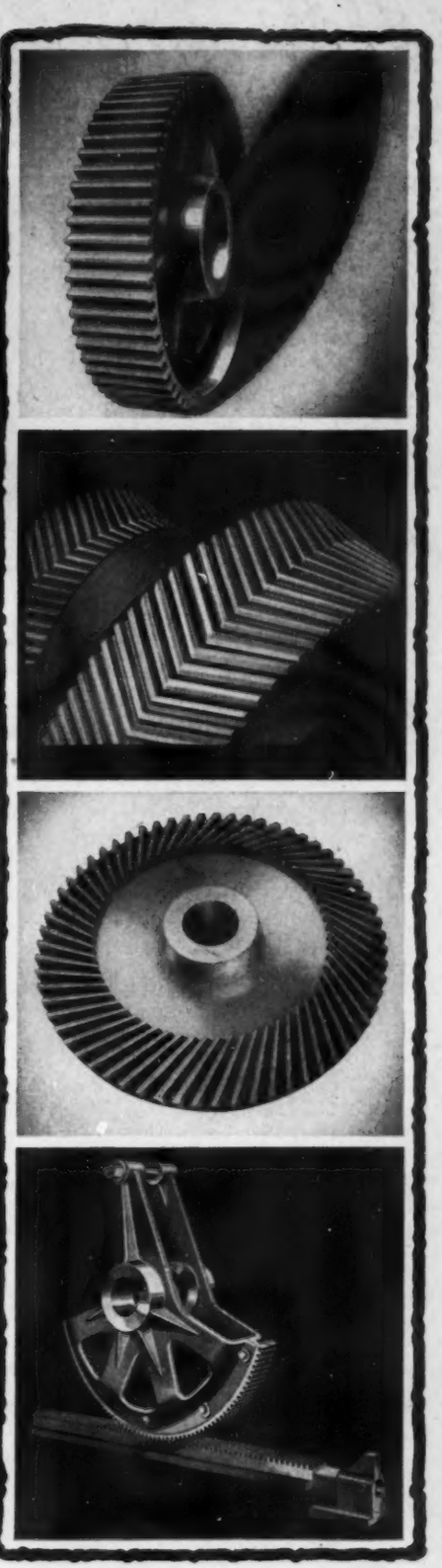

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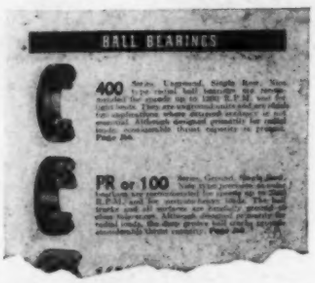

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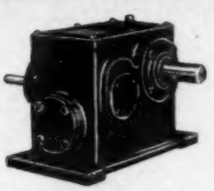
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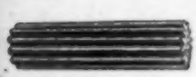
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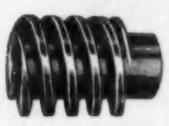
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GENERAL CATALOG NUMBER 54

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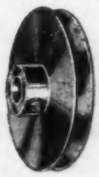
BALL BEARINGS

UNIVERSAL JOINTS

COLLARS

SHAFT SUPPORTS



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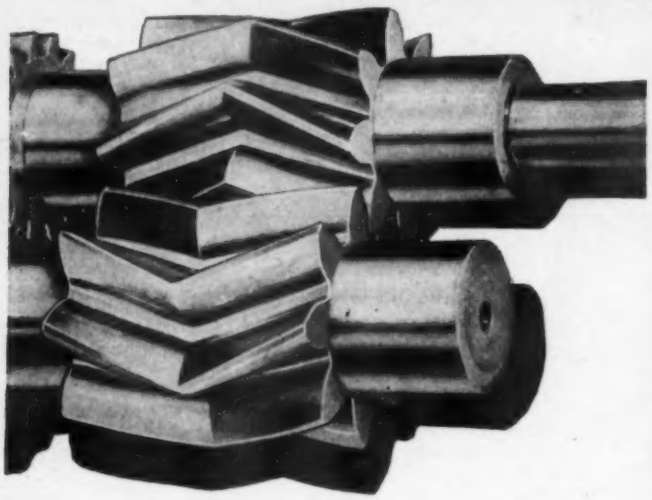

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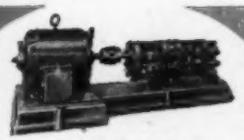

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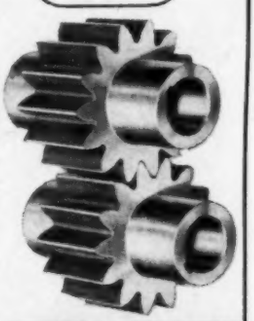

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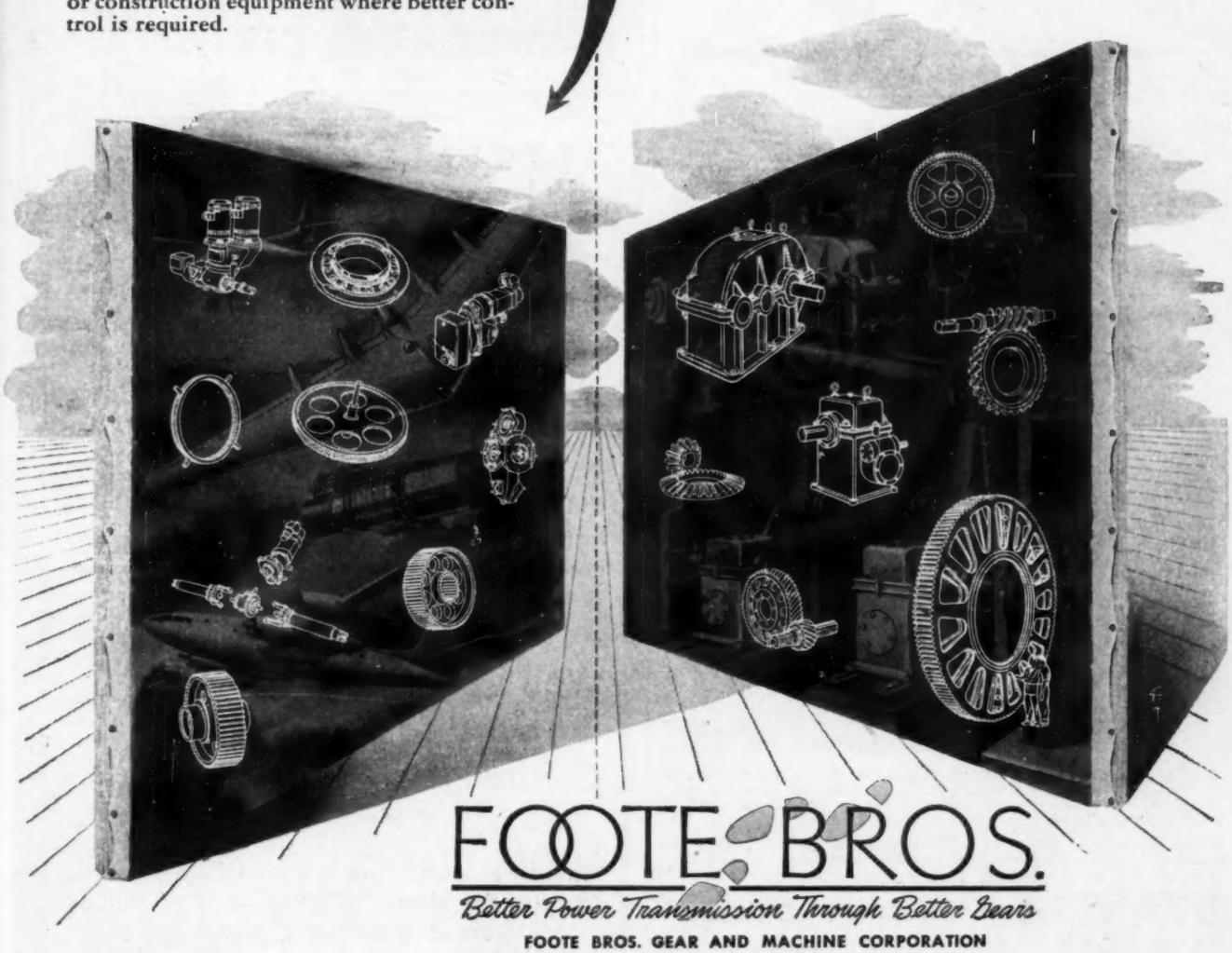

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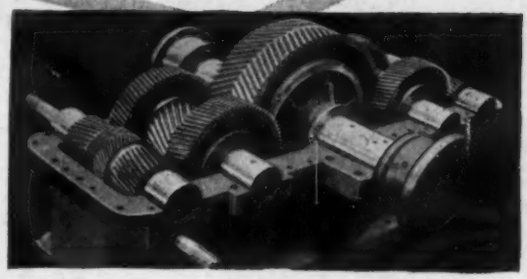
what about sykes gears?



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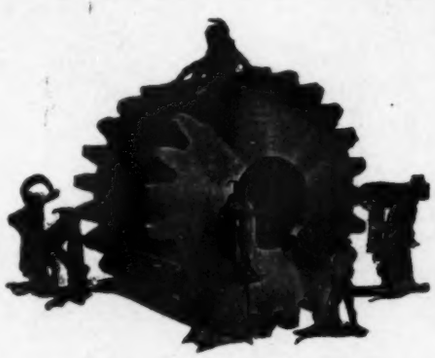

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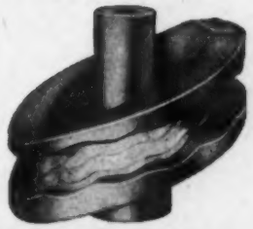
- . . . furnishing aeronautical parts on a contract basis

You plan and we execute—assuring speedy production, prompt delivery and reasonable price. Send blue prints or samples for estimate.



THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD, CONN.

DESIGNED TO MEET COMPETITION .....

This Baush W-7 drills and reams the wrist and crank-pin hole in 100 automotive connecting rods every hour

Speed, plus quality of work, means extra profits and lower selling costs—the essence of today's competition in the automotive industry.

For many years Baush Multiple Operation Machine Tools have kept abreast of manufacturers' demands for special purpose equipment that increased production without sacrificing quality of workmanship.

Baush Engineers are ready to help solve your production problems on reaming, drilling, tapping or boring —*wire, phone, or write us today*—there is no obligation.

Baush Vertical Heavy Duty W-7 Hydraulic Multiple Spindle Drilling Machine has cast iron column and base—ample coolant trough and sump—hydraulic pump and cylinder with 18" max. stroke and adjustable feed rates. Ball-bearing fixed center head is furnished with 6 spindles #2 M.T. and 6 spindles #3 M.T. Head arranged with pick-off gears for speed changes and counter-weighted for perfect balance. Ample flow of coolant to all cutting tools. 25 H.P. Motor drives spindles—2 H.P. Motor for hydraulic pump—both motors are ball-bearing, fan cooled and totally enclosed type.

Rotary fixture of four double holding units holds 2 connecting rods at each of 4 stations using 44" dia. hand-indexed rotating table:

Station 1—Unload and load 2 rods.
Station 2—Drill wrist-pin holes—core drill crank-pin holes.
Station 3—Rough ream wrist and crank-pin holes.
Station 4—Finish ream wrist and crank-pin holes.

Rods locate on 2 centers at both small and large ends. Centers at one side are adjustable, with other side movable and designed to equalize pressure at both ends of rod. Torque clutch arrangement prevents any excess pressure that might distort part.

Bushing plate suspended from head guides tools and rests and registers on each and every holding unit.

Approximate net weight 25,000 lbs.

BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

PRECISION --by the Ton

It's hard to imagine any work requiring more precise manual delicacy than that of a fine watchmaker. Handling tiny parts doesn't demand much strength, which is fortunate because hands capable of such fine work are seldom muscular. This combination of power plus precision—rare in machines—is the key to important production economies in modern industry.

It is common knowledge that *presses* deliver parts faster and at less cost than any other means of production. They exert enough force to make cold metal flow, and ordinarily shape complete parts in a single stroke. Clearing presses have been designed and built to extend that kind of economy to "stampings" weighing as much as a ton each, and to forming and coining operations where tolerances are expressed in ten-thousandths of an inch. Finished parts formerly cast, or welded, and slowly machined, can often be produced to advantage on a Clearing press.

Traditional methods of manufacture may be costing you unnecessary production expense. If you'd like to look at your operations in a new, modern light, Clearing can help you. It's worth trying, and it costs you nothing to consult with our engineers. A letter, a phone call or a telegram today might bring you a valuable weapon for the competitive business battle of tomorrow.

The progress of modern science is being helped by this specially built, high-precision Clearing laboratory press.

CLEARING

THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION

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Key to **LOWER STAMPING COSTS**

CATALOG No. 47

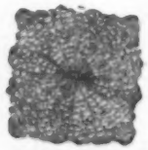
H & W Dieing Machines for COMPLETE-PER-STROKE stamping

Save 60% to 90%

Ability of the Dieing Machine to deliver High Production AND High Quality, stems from its unique "upside-down" construction. There is maximum smoothness and precision of register, so that work can be held to .002" when required, and dies last 6 to 12 times as long. While it produces intricate stamping complete per stroke with progressive dies. The Dieing Machine also is exactly right for simple blanking and piercing jobs, giving new low cost on laminations from .003" up, with beautifully clean edges. If you use stampings in quantity, this machine can save you many thousands.

REQUEST CATALOG 47

Can opener blade requiring eight operations produced complete per stroke at greatly increased rate.



Novelty jewelry piece produced complete per stroke.

Transformer lamination of .009" silicon steel produced complete per stroke 36,000 per hour.

HENRY & WRIGHT MFG. CO.
482 WINDSOR STREET HARTFORD 1, CONN.

HENRY & WRIGHT DIEING MACHINES

+ INCREASED PRODUCTION
— REDUCED SETUP TIME
= DAYTON ROGERS DIE CUSHIONS

No matter how you figure it Dayton Rogers Die Cushions will assure better results and lower production costs on your punch press operations because:

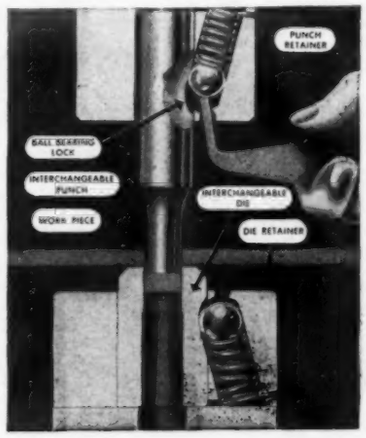
1. They are readily adapted to either short run quantity requirements or for large quantity production.
2. They automatically convert a press from single action to double action for deep drawing work.
3. Correct pressure pad control on forming dies obtained quickly by simply adjusting the pressure regulator.
4. They afford positive stripping action on all compound, blanking and piercing dies.

Write for illustrated, engineering catalog #100-1

DAYTON ROGERS
Manufacturing Company
MINNEAPOLIS 7, MINN.

PUNCHES and DIES are *Quickly* INTERCHANGEABLE

Allied's R-B Interchangeable Punches and Dies are quickly installed for trouble-free production in the metal-working and plastics industries. They are available from stock in *standard* round, oblong and square shapes of almost any required size. Specials of any size, shape or material are promptly furnished to your specifications—and delivery dates are *dependable.*

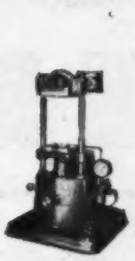


Write today for large illustrated R-B Catalog.

ALLIED PRODUCTS CORPORATION
Department 20
4612 Lawton Ave. Detroit 8, Michigan

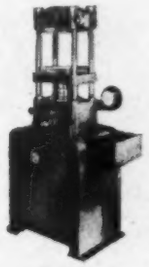
Fast, full power-operation
WITHOUT MOTORS OR PUMPS

50-ton Hydrolair, shown with lever control. 18" x 18" platen and hot plates. Overall dimensions: 40" x 27" x 65" high.

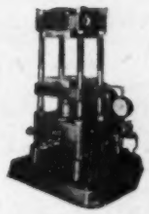


20-Ton, Bench-Type

20-Ton, Floor-Type



30-Ton, Floor-Type



30-Ton, Bench-Type

NEW BULLETIN GIVES ALL THE FACTS

Bulletin 1036 tells the whole story—gives types, sizes, complete specifications. 20-ton presses have 8" x 8" platen; take 8" x 8" hot plates. 30-ton presses have 10" x 10" platen; take 10" x 10" hot plates. 20- and 30-ton floor-type models have handy shelf for tools.

THE NEWEST OF THE NEW
ELMES HYDROLAIRS

Patents Applied For

Hydrolairs are the *most economical* of all power-operated hydraulic presses to buy—and to use. They take their power *entirely* from the shop air line.

Each press is a complete, self-contained "package." Compact. Easy to install—and to *move* if ever necessary. Automatic, push-button, time-cycle control is optional on the 50-ton model, and a breathing cycle can be added, if desired.

No other hydraulic press can match new Hydrolairs for cost-saving, *speedy performance.* They turn out a *lot* of work. Phone, wire, or write for complete information. Distributors coast to coast.

ELMES
Since 1851
HYDRAULIC EQUIPMENT

LEVER CONTROL

Simple lever control on 20- and 30-ton models—and when furnished on 50-ton presses—governs both quick-closing and *instantaneous* full pressure. Pressed maintain selected pressure, and repeat at that pressure until reset.

ELMES ENGINEERING WORKS *of* **AMERICAN STEEL FOUNDRIES,** 1001 Fulton Sreet, Chicago 7, Ill.

METAL-WORKING PRESSES · PLASTIC-MOLDING PRESSES · EXTRUSION PRESSES · PUMPS · ACCUMULATORS · VALVES · ACCESSORIES

SAVE ON LIGHT PRESSWORK WITH A

famco

FOOT PRESS

Production line economies are accomplished wherever one, or a whole battery of Famco Foot Presses are used to do light punching and forming jobs. Famco presses eliminate cumbersome, space-consuming equipment that use up electric power. Pictured above is a typical installation of Model 8 S Famco Foot Presses, putting pep into production at Webster Electric Co. of Racine, Wisconsin. Each of the ten sturdy, foot-powered models can be located anywhere . . . they require no wiring, motors or line shafts. Their effortless operation makes them ideal for women employees to attain speed and accuracy, without tiring. Investigate the cost-cutting possibilities of Famco Foot Presses.

OTHER POWERFUL MACHINES THAT NEED NO POWER

Famco Arbor Presses, in 32 models, bench and floor mounting, will deliver up to 15 tons pressure . . . require no electric power.

Famco Foot-Powered Squaring Shears will cut up to 18 gauge mild steel with accuracy and speed. Ruggedly constructed and available in five sizes.

FAMCO MACHINE CO. • 1316 18TH ST. • RACINE, WIS.

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ARBOR PRESSES • FOOT PRESSES • SQUARING SHEARS

BETTER ASSEMBLY

FORMING • EMBOSSING
RIVETING • HEAT-SEALING
CRIMPING • BROACHING
MARKING • STAKING • ETC.

AIR-HYDRAULIC PRESS

SIZES: 2½ TON AND 6 TON CAPACITIES

DOES MORE JOBS—Countless operations in metals, plastics, ceramics, leathers, etc. Delivers delicate pressures for the lightest jobs, or up to 2½ or 6 tons pressure . . . for work now being done on presses many times the size.

SIMPLE OPERATION — Quick action hand or foot operated valve or solenoid valve with push-button control requires no physical effort. No noise, no impact shock, no operator fatigue.

CONTROLLED AIR PRESSURES—Just tap into your present air line. Delivers ram pressure 50 and 120 times air intake pressure on 2½ and 6 ton models respectively. Adjustable, predetermined pressure delivered entire length of stroke —regardless of thickness variations of work.

SIMPLE CONSTRUCTION — All working parts contained within housing. No cams, levers, pins, gears in power mechanism. No intricate assemblies to get out of order, fewer parts liable to wear than any other press in the field.

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AIR-HYDRAULICS, INC.
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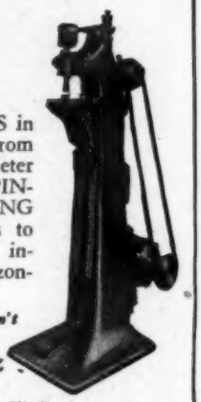
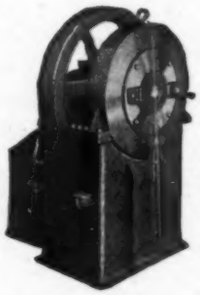
GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to ⅝" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.



THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.



THE
TORRINGTON
ROTARY
SWAGING MACHINE

— with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Torrington Swaging Machine."

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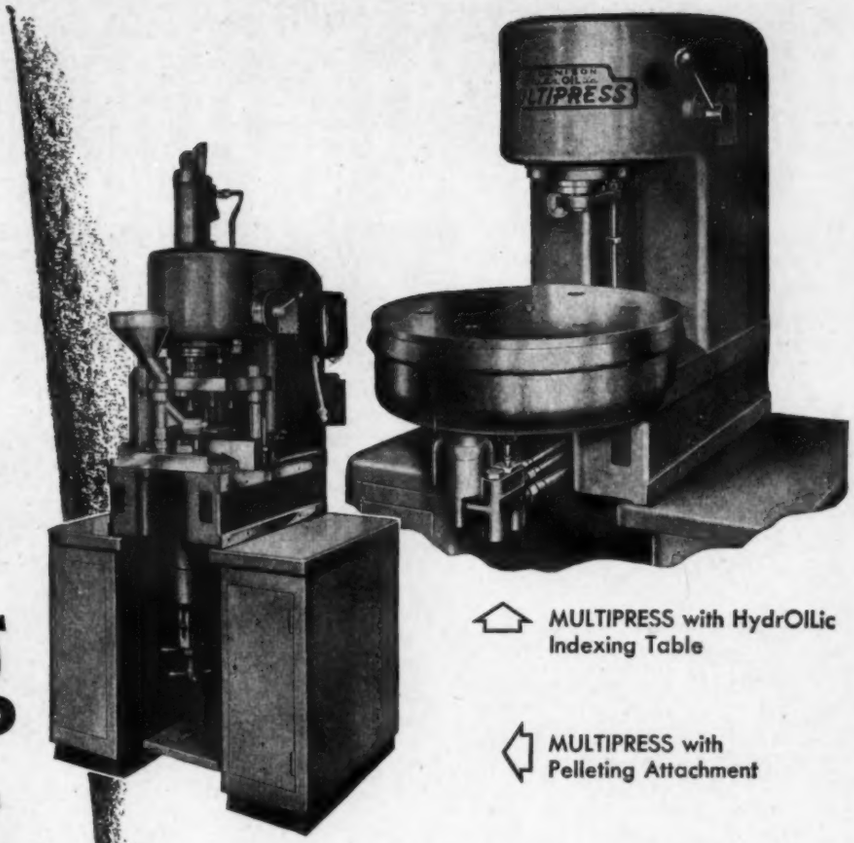
56 Field Street Torrington, Conn.

Blanking Forming Pelleting Shearing Marking Assembling with MULTIPRESS



MULTIPRESS with HydrOlLic Indexing Table

MULTIPRESS with Pelleting Attachment

Basic 4-Ton MULTIPRESS (Also 6 & 8 ton capacities)

On scores of jobs like these—and many others—MULTIPRESS users continue to report higher production, increased efficiency and better results.

The reason: remarkable operating flexibility has been built into the highly compact, fully self-contained *basic* MULTIPRESS—and its flexibility has been further multiplied by an unusually wide range of standard MULTIPRESS controls, toolings and accessories.

In addition, Denison research engineers work constantly to find better ways to apply MULTIPRESS advantages to specific operations of every kind.

MULTIPRESS offers a choice of 4, 6, or 8-ton units . . . seven different models . . . manual or automatic controls . . . accessory benches, work-table extensions, side shelves and bolster plates . . . attachments for indexing, pelleting, foil marking, etc. . . . toolings for almost any need. Write for full details. The Denison Engineering Company, 1164 Dublin Road, Columbus 16, Ohio.

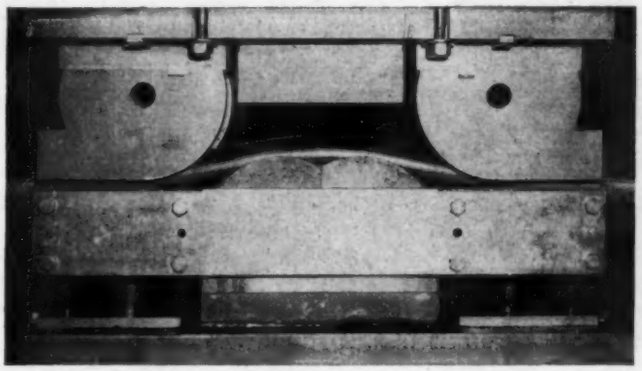
HydrOILics INDUSTRY'S MIGHT HAND

DENISON EQUIPMENT in APPLIED HydrOILics

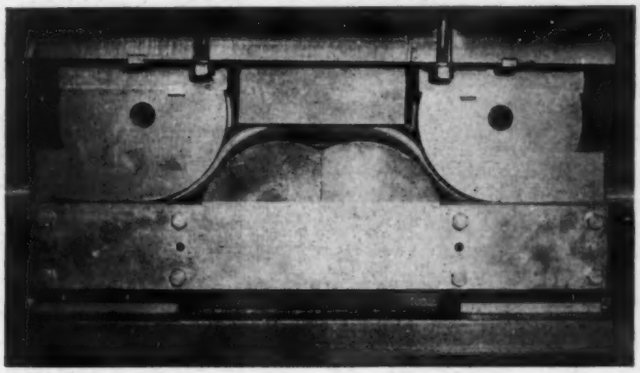
LAKE ERIE Hydraulic Press

● 275-Ton Lake Erie Hydraulic Press producing Bent Tubular Cross Frame Members "cold" in the plant of The White Motor Company. Ram pressure for this job is approximately 150 tons...cushion pressure approximates 50 tons. Lake Erie Hydraulic Presses are available in a wide range of standard types and sizes to meet most needs. Special presses are quickly engineered to order when required.

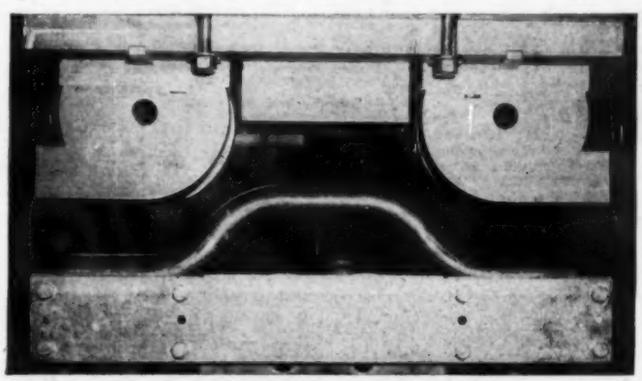
increases production for the White Motor Company



1 Tube being bent "cold" is 1020 SAE steel, 2½" diameter, ¼" wall, 33" long. Ends of tube must be parallel, in line and show no eccentricity of tube diameter for 4½". This is readily accomplished with end plugs, as shown.



2 Illustration above shows Lake Erie Hydraulic Press at bottom of forming stroke. The four bent radii are 5" measured on the center line of the tubing. The offset between the center portion of the tube and the ends is 4⅞".



3 Completed Tubular Cross Frame Member is shown at the left. Filling operation was required when tubes were "hot" formed. This operation is eliminated with a Lake Erie Hydraulic Press, another of the advantages of this type of forming.

The White Motor Company formerly manufactured Bent Tubular Cross Frame Members "hot" in their Blacksmith Shop. Now they are formed "cold" on a Lake Erie Hydraulic Press. The White Motor Company has found that considerable savings are naturally effected with this method of manufacture as compared to the old, and output per day to meet scheduled requirements is another exceptional advantage of the use of this Hydraulic Press.

This is just one more in a long list of examples of the manner in which today's hydraulic presses increase production, improve product quality and lower manufacturing costs. It will be worth your while to check up on the advantages of hydraulic presses for various phases of your production. A Lake Erie Engineer will be glad to assist you with recommendations regarding applications and types of presses to meet your particular requirements.

● Leading manufacturer of hydraulic presses—all sizes and types—metal working... plastic molding... processing...rubber vulcanizing...stereotyping ...special purpose.

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ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

LAKE ERIE ENGINEERING CORP.
MANUFACTURERS OF
HYDRAULIC PRESSES AND SPECIAL MACHINERY
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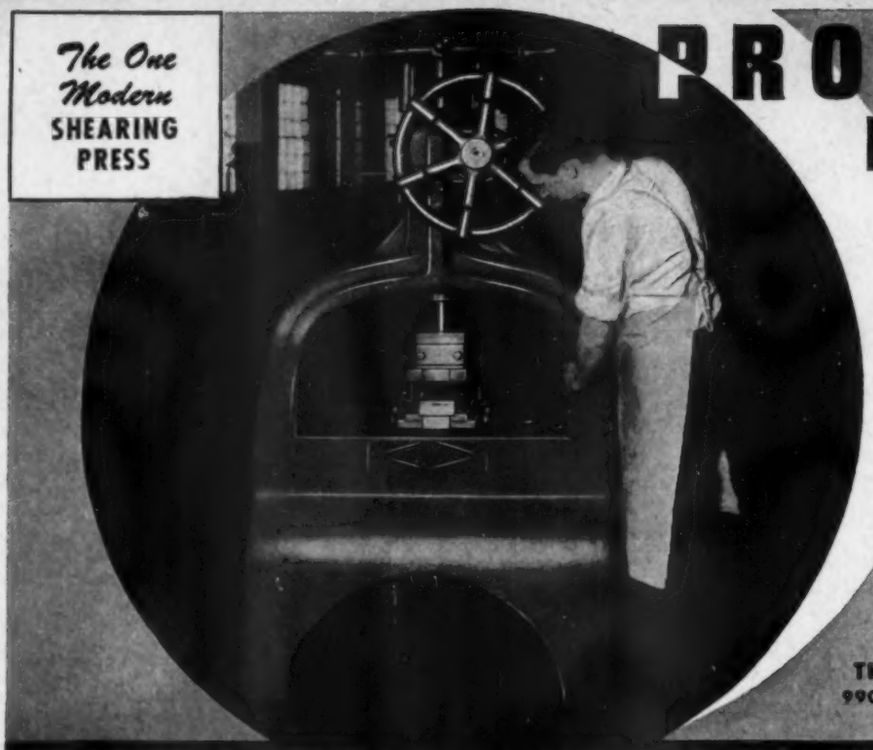

PRODUCTO
No. 2 UTILITY PRESS

50 TON CAPACITY

Just what its name implies... the modern versatile Screw Press...for shearing, assembling and lining punches and dies... for separating large die sets...for short broaching operations, assembling or disassembling press fit components, bearings etc.. Also as an arbor and straightening press. Low in cost. High in time and cost-saving value.

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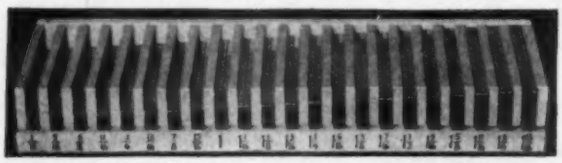

Price per set includes a handy Wooden Container. Large Stock of Single Pairs also Available. All Prices are F.O.B. New York

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BAUMBACH *The* DIE SET AUTHORITY

All Baumbach Die-Sets have demountable Leader Pins and Bushings. This exclusive feature permits removing Leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.

E. A. BAUMBACH MFG. CO., 1804 S. Kilbourn Ave., Chicago 23, Ill.

PRESSES
FEEDS
AUTOMATIC EQUIPMENT
THE V & O Press Co.
HUDSON N Y

300 TWIN BENDS *per hour!*

With Two DI-ACRO BENDERS A difficult production problem of forming two bends in a long length of tubing was solved by "teaming up" two DI-ACRO Benders as illustrated. This dual-forming arrangement saved installation of special machinery. Two accurately formed bends are obtained in one operation—without distortion of the tube and at a cost competitive to power operated equipment. More than 300 pieces are completed per hour —600 individual bends.

"DIE-LESS DUPLICATING" Often Does it Quicker WITHOUT DIES

This is but one example of how DI-ACRO precision machines—Benders, Brakes and Shears—can accurately and economically duplicate a great variety of parts, pieces and shapes, without die expense. *Write for Catalog—"DIE-LESS DUPLICATING"*

DI-ACRO is pronounced "DIE-ACK-RO".

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

O'NEIL-IRWIN MFG. CO.
311 EIGHTH AVENUE • LAKE CITY, MINNESOTA

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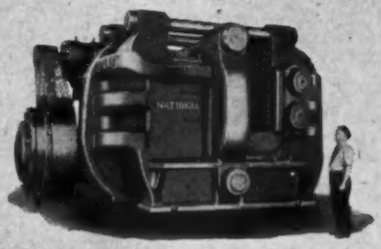
Forged complete with hole, throughout its entire length, this Automotive Axle Housing is another example of the ability of National High Duty Forging Machines to show big savings.

Not only does the National produce such jobs to closer dimensions—thus saving expensive material and reducing machining time—but it also produces them faster.

If you have a forging problem, may we help you solve it?



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TIFFIN, OHIO.

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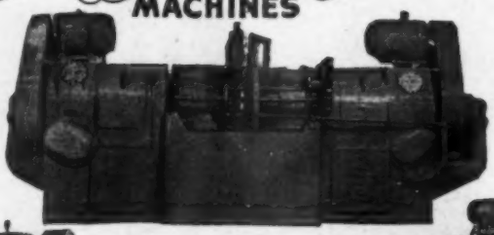
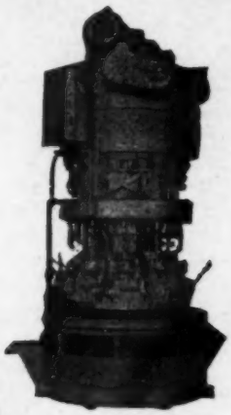
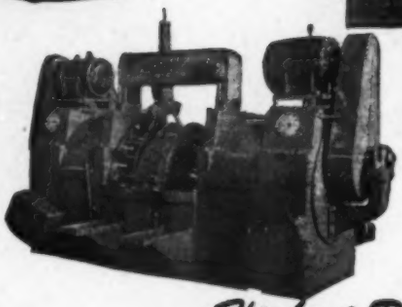
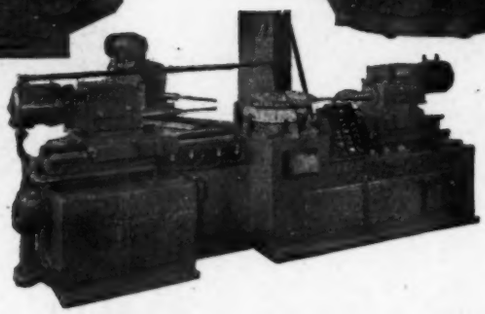






MULTIPLE SPINDLES



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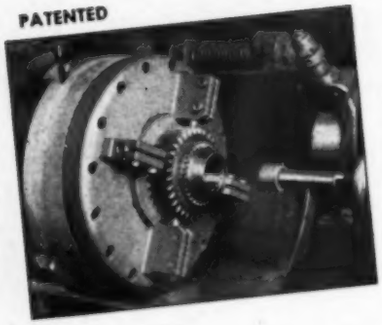

Look, a high speed, precision chuck with no parts to wear out! ***Result:*** Maximum accuracy, minimum maintenance! ***Because*** the Woodworth design assures the ultimate in concentric chucking. ***Obviously***, it will solve your precision chucking problems, as it has already for large manufacturers of gears and other production parts. Send your precision chucking problems to us—at no obligation.

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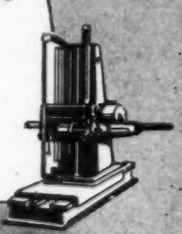
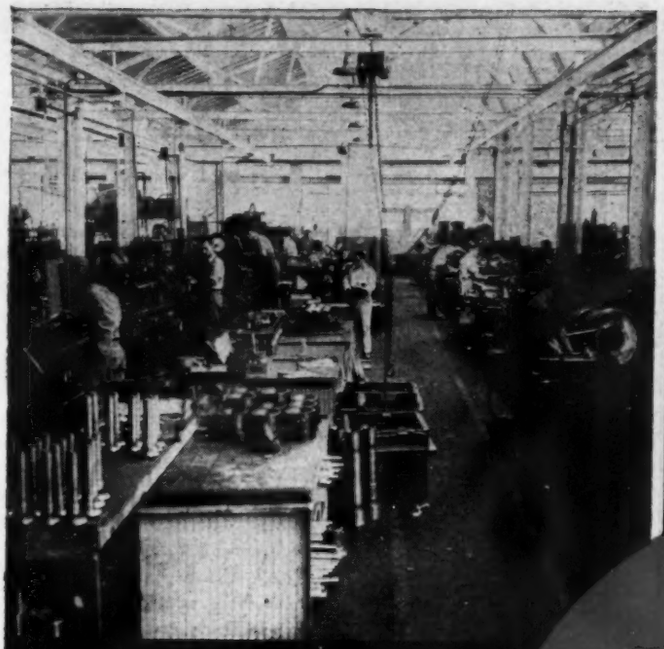
PRODUCTION SPEEDING RADIAL DRILLS AND HORIZONTAL DRILLING, BORING AND MILLING MACHINES



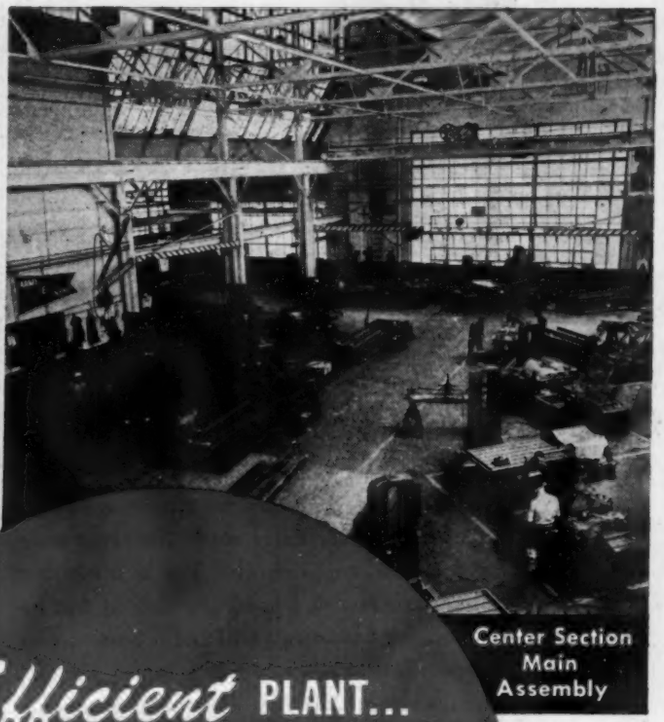
DETAILS ON REQUEST

THE CINCINNATI GILBERT MACHINE TOOL CO.

CINCINNATI, OHIO



Grinders and Heavy Lathes



Center Section Main Assembly

Turret Lathes and Screw Machines

Efficient PLANT... *Experienced* PLANNING!

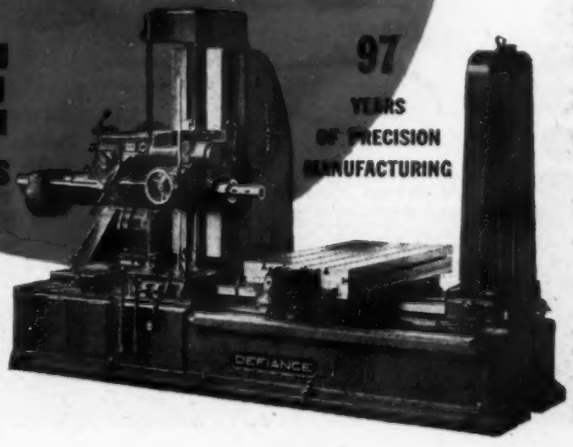
Since the days of 1850 when fine carriages and wagons were produced with the help of Defiance-built precision machines for wood-turning . . . *accuracy* has been the watchword at Defiance!

Today—planning, plant and production at Defiance are geared to achieve the utmost *accuracy* and *efficiency* in Defiance machines for the Age of Metal. These include the finest heavy machines for boring, milling, drilling and tapping. Engineered with the experience of 97 years . . . built to help you *produce more*, with *greater precision* and *lower costs*. Defiance Machine Works, Inc., Defiance, Ohio.

DEFIANCE

BORING . . . MILLING . . . DRILLING . . . TAPPING MACHINES

97 YEARS OF PRECISION MANUFACTURING



Defiance No. 25A Horizontal Boring Machine is designed with outboard bearing supports allowing maximum cross travel without sag. It has a 3¾" bar . . . 20 speeds range from 12 R.P.M. to 1000 R.P.M. . . . 30" x 60" table. Oversize construction insures rigidity.

THE RIGHT BLADES COST LESS

ONE type of blade cutting many types of work costs money in spoiled work, needless replacements. Many find that buying a separate blade for each type of work from a VICTOR supplier—backed by *a complete line of* VICTOR blades, frames and band saws—saves money, increases blade life. Not only can the VICTOR supplier give you a blade for every job a hack saw or a band saw can do, but he can give you the blade that will cut it better. You get the type of fast, clean cutting on metal, plastics, and other non-metallics—plus a world of wear—that earns VICTOR its name. Yes, just as you'd expect, a blade made for the job costs less . . . and VICTOR makes a full line of blades for *every* cutting job.

Your VICTOR supplier has this pocket-size booklet on hack saw blades—their care and selection—waiting your request. It's practical. It's free.

HAND BLADES

POWER BLADES

FRAMES

BAND SAWS
(Metal Cutting, including Skip-tooth)

Sold only through recognized distributors

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VICTOR

Victor Saw Works, Inc., Middletown, N.Y.
Makers of Hand and Power Hack Saw Blades, Frames and Metal Cutting Band Saw Blades

LOOK TO LINLEY FOR LOW COST MILLING . . . JIG BORING

- 8 velvet-smooth spindle speeds to 4250 r.p.m.
- Rapid setup . . . easy changeover.
- Direct micrometer setting.
- Grease-sealed bearings, anti-backlash quill travel.
- Ample table size, 7" x 17½".
- Needs only 18½" x 20" floor space.

These factors all add up to fast, economical work on small dies, jigs, fixtures, patterns and models . . . saving large machines for their higher rated capacities. Hitch your tool-room problems to a Linley and watch the profits soar!

Get Bulletin . . . NOW

LINLEY BROTHERS COMPANY
664 STATE ST. EXTENSION
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KEYSEATING
The Modern Way

Illustration shows typical set-up for cutting taper keyway with table tilted.

Machines are made in three sizes for keyways 1/16" to 1¼" in width.

Great simplicity and ease of operation of Davis Keyseaters assure the user of accurate, time saving work.

Let our engineer study your keyseating problems.

DAVIS KEYSEATER COMPANY
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MICROHONING

is the Quicker, Better, Lower Cost Method

For Example:

THIS 4130 STEEL ROCKET TUBE, ROCKWELL 34-38C

Size: 4.220″ diameter x 20.5″ long.
Preceding Operation: Diamond Bore.
Average Stock Removed: .030″ on diameter.
Average Time: 5.45 minutes
Average: 1.5 cubic inch per minute.
Average: .0055″ on diameter per minute.

Another Example:

Aircraft Propeller Blade Tubing

Size: 8.000″ diameter x 96″ long.

Preceding Operation: Drawn Seamless Tubing with scale in bore.

Average Stock Removed: .050″ to .080″ on diameter (approximately 156 cubic inch in bore).

Average Time Required: 65 minutes.

2063

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does the complete job!

- ✓ DRILLING
- ✓ BORING
- ✓ REAMING
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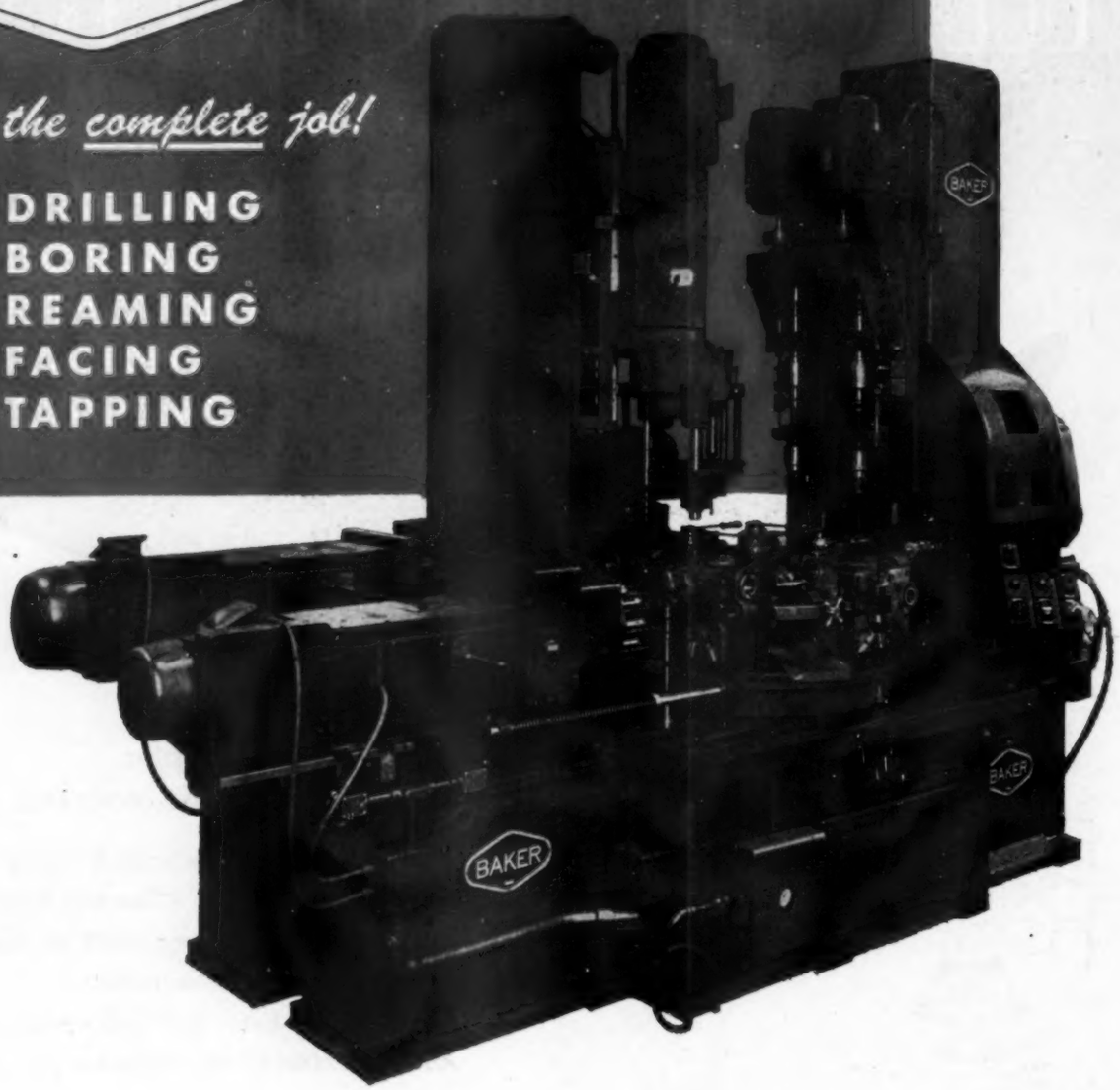
- ✓ TAPPING



Here's another Baker-engineered answer to demands for better machines . . . that lead to *increased productivity!*

This special Baker multiple unit multiple operation type machine is designed to complete all drilling, boring, reaming, facing and tapping operations in production of gas regulator bodies for a Western manufacturer.

The machine has a four station automatic power indexing table, each station arranged for rechucking one part and the chucking of one new part. Built around this index table are ten independently fed auxiliary units.

Flexibility required due to various sizes of regulator housings, some being ¾", 1", 1¼" pipe tap and flange holes varying with 8 holes on one bolt circle and 10 holes on a different bolt circle. Multiple head furnished on unit at first working stations has 18 spindles . . . arranged to pivot to accommodate varying bolt circles without removing head from unit. Baker Engineers will gladly work with you on problems where increased productivity is your goal. Write us about it.

BAKER BROTHERS-Inc. TOLEDO OHIO

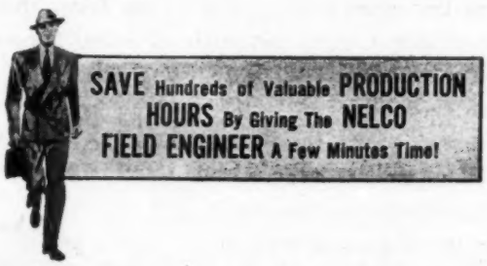
DRILLING - BORING - TAPPING AND KEYSEATING MACHINES

For That Extra Edge In Production

Check these 8 facts now...about NELCO

Carboloy-Tipped Side Milling Cutters for Straddle Milling, Half-Side Milling and Slotting

- ☐ AT *NEW* REDUCED PRICES EFFECTIVE AT ONCE!
- ☐ Mill up to 20 times *faster!*
- ☐ More pieces between grinds—with *finer* finish!
- ☐ All-Alloy *Steel* Bodies!
- ☐ Thicker, Sandwiched-Brazed, Precision-Ground Tips!
- ☐ Copper or Cadmium Plated for easy job identification and to *prevent* rust!
- ☐ Sizes 3" to 8" dia., ⅛" to 1" width — *available in stock!*
- ☐ Shipped individually protected by special plastic coating!



On Request!

Your copy of this new 28-page catalog illustrating and describing the complete line of Nelco Carboloy-Tipped Cutting Tools. Includes valuable engineering data and price lists. Send for it today.

NELCO TOOL CO., INC.

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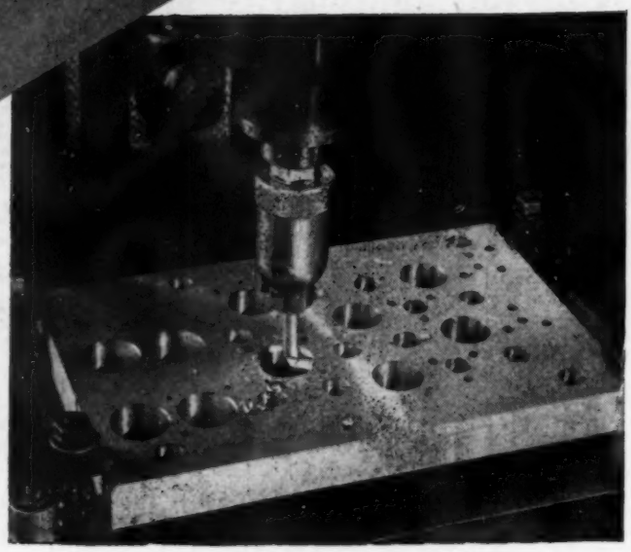
HOW TO OBTAIN *increased speed* AND *closer tolerances* IN JIG BORING



NO S-T-O-P and S-T-A-R-T TO CHANGE TOOLS AT EACH HOLE

In the Moore Jig Borer you can *consecutively* spot, drill, bore and ream *all* holes in the work-piece with minimum tool changes. In other words, you don't have to change tools at individual holes for each operation, because there are no size blocks or end measures to labor over.

Accurate lead screws *built into* the Moore Jig Borer enable you to make table settings faster than you can change tools. A glance at your blueprint—a few turns of the micrometer dials and the work is set to precise location. Moore lead screws, accurate to .0002" over 14" of travel and .00005" in any given inch see to that. Another advantage—you make each setting three times, enabling you to quickly notice and correct any errors you may have made.

The Moore Jig Borer is ideally suited for jigs, fixtures, dies, special machine parts and jig-less, small-lot production. It is highly sensitive for holes 1/32" diameter, yet rugged for heavy cuts up to 4½".

RAPID TABLE SETTINGS PROMOTE GREATER ACCURACY IN FINISH BORING

Rapid table settings on the Moore Jig Borer encourage operators to follow the best toolroom practice—roughing *all* holes before finish-boring *any* of them.

Moore lead screws are so fast to set—faster than tool changes—that it *pays* to pre-rough all holes. Temperature changes or stresses caused by roughing cuts *cannot* interfere with finish-boring.

After roughing, the set-up can be easily checked and re-set before taking any finish cuts.

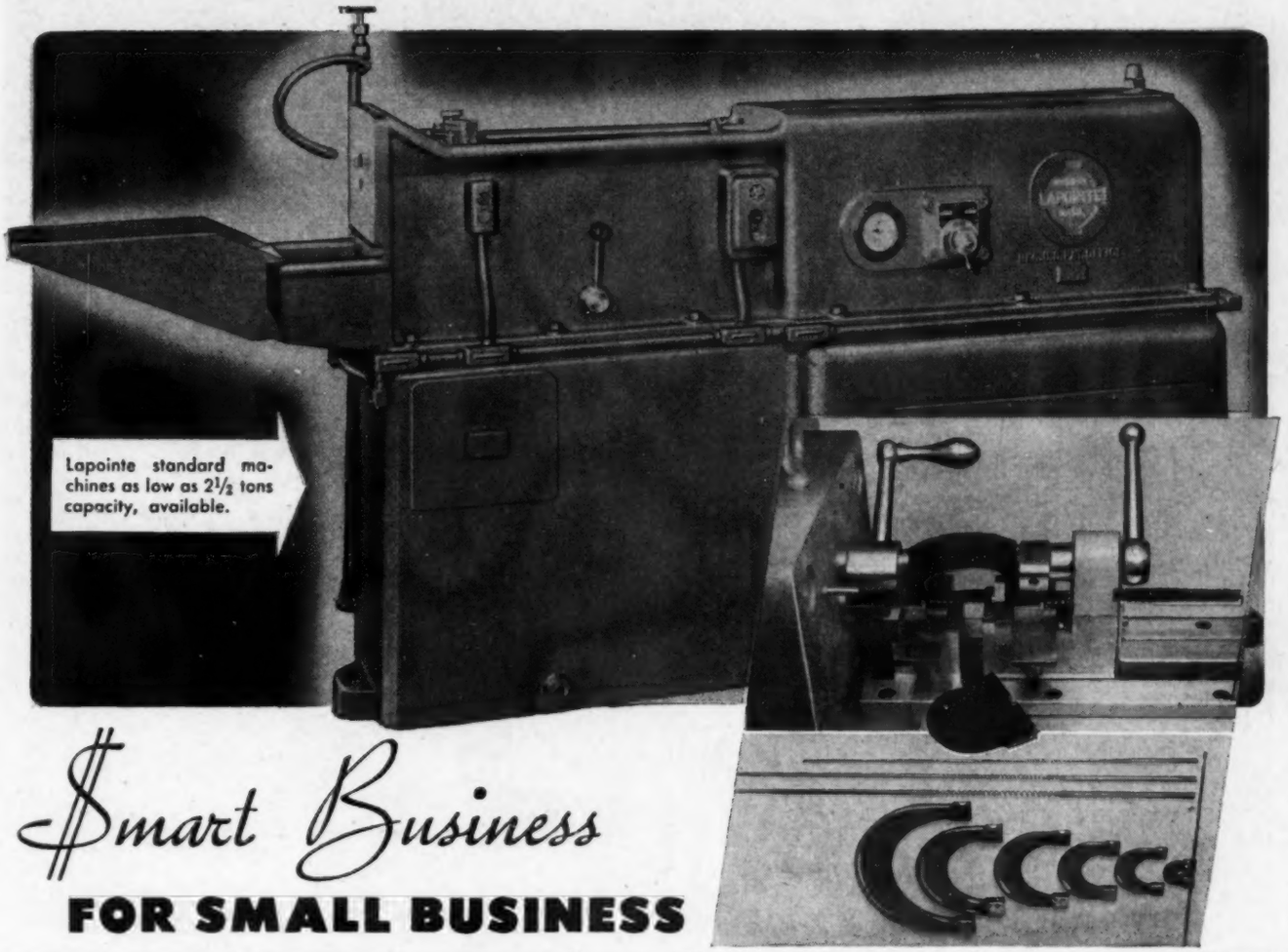
All finish-boring is completed without stressing or heating of the work-piece. These favorable conditions, maintained throughout the entire finish-boring operation, on the Moore Jig Borer, are further assurance of ultimate accuracy in the completed work.

Write today for descriptive literature

MOORE MAKES TOOLS

MOORE JIG BORER

MOORE SPECIAL TOOL CO., INC., 738 UNION AVE., BRIDGEPORT 7, CONN.



Smart Business
FOR SMALL BUSINESS

Above: Gage frame shown in fixture of machine, and finished piece. Below: Set of Broaches used and six frame sizes broached.

Lapointe broaching is not limited in its usefulness solely to large manufacturers whose volume production runs permit large outlays for expensive broaching equipment.

Lapointe engineering now brings the benefits of broaching to the small manufacturer whose production runs are limited and varied. The standard line of Lapointe small horizontal broaching machines, particularly adapted for use with various inexpensive, but ingeniously devised, fixtures is well within the price range of small business. The ease with which fixtures can be interchanged for varying jobs makes it economical and efficient.

Recently, Lapointe engineers designed for a manufacturer of snap gages an inexpensive workholding fixture to be used with a standard horizontal broaching machine which gave fast and efficient performance on short production runs. His problem was the cutting of a set of square holes in each end of a horseshoe-shaped gage frame.

This single fixture, of relatively simple design, accommodated the entire range of six frame sizes. It was so planned that it not only properly positioned these frames for broaching, but also held them sufficiently rigid to prevent distortion from springing. With this equipment, four square holes per piece were broached at a rate of 90 frames an hour, with tolerances of .0003 on each hole.

Investigate what a small investment in broaching equipment can bring *you* in production dividends.

Write Dept. M for the 124 page Instruction Manual, containing full specifications on Lapointe machines.

THE *Lapointe* MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

Branch Factory • Edgware • Middlesex • England

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

Whips the TOUGH jobs too!

The severely interrupted cut in facing this crankshaft requires the steep negative back rake shown.

Firthite sintered carbide tools take the hard jobs as well as the easy jobs in stride—as evidenced by the case history shown above.

Firth Sterling offers a complete metal cutting service on either high speed steel tools (Circle-C or Blue Chip) or sintered carbides (Firthite). Let our trained Cutting Tool Engineers help you to make the right decision on your cutting problems.

THE JOB

PART: Crank forging.
MACHINE: Turret Lathe.
OPERATION: Face crankshaft cheek.
CONDITIONS: 182 RPM (over 300 feet per minute)—at 0.006 FPR.

THE TOOL

FIRTHITE Grade TO4, 1" x 1½" x 5" —35° negative back rake, 18° positive side rake.

RESULTS

9 to 12 pieces per grind as against 3 with former tools.

Call **Firth Sterling**

STEEL & CARBIDE CORPORATION

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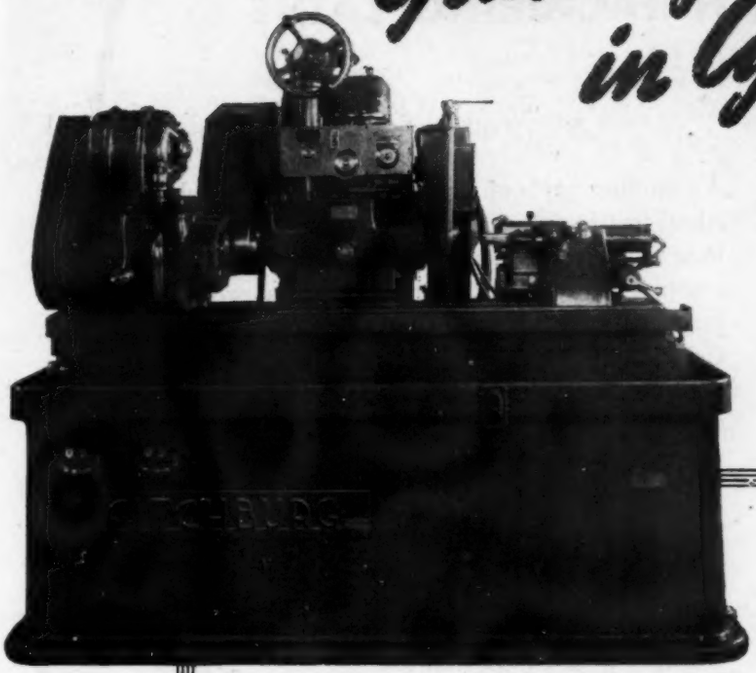
Why Fitchburg "Push Button" Grinding is the Best Buy in Cylindrical Grinding!



1. You get the highest *QUALITY* GRINDING . . . exactly the finish and *exactly the precision* you desire—*automatically*—on the most accurate grinding machines that you can buy.

2. You get the *HIGHEST RATE OF PRODUCTION* because Fitchburg Grinders—with the famous exclusive Fitchburg Bowgage Wheelhead—make the best use of the time factor: spend very little time cutting air; use the very minimum time necessary to get the required results. One operator can run two or more machines—or he can perform other work during the automatic grinding cycle.

3. You can use *LESS-SKILLED HELP* with Fitchburg Automatic Grinders. Our 25 years of concentration on cylindrical grinding problems have resulted in machines that make precision grinding a simple, easily-performed task.

4. For the above reasons, plus others such as Automatic Size Control, Multiple Grinding, easy adaptation of Fitchburg Bowgage Wheelheads to operational changes—all these make available to you cylindrical grinding at its highest state of efficiency—to give you the *LOWEST COST-PER-UNIT*—for the BEST BUY in today's and tomorrow's market.

Fitchburg's analysis of your cylindrical grinding problems is yours for the asking. A letter giving us the data will in no way obligate you.

FITCHBURG GRINDING MACHINE CORP.
FITCHBURG, MASSACHUSETTS, U. S. A.
Manufacturers of—Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Both Full Universal Grinders and Special Purpose Grinders

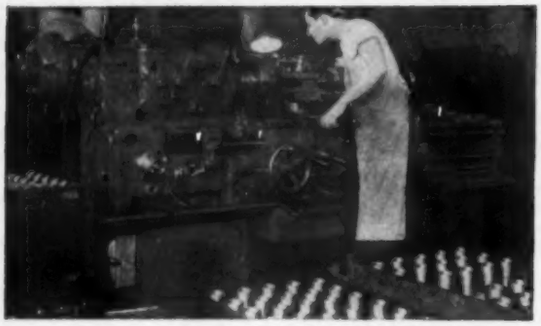
PRODUCTION VERSATILITY with . . .

THE HENDEY 4C MANUFACTURING LATHE

SMALL WORK . . .

All moving parts of the 4C are made from selected materials, properly heat-treated and finished to precise limits—gears are shaved, spindles are machined forgings, bearings are super-precision, pre-loaded. This sound construction, coupled with functional design, provides the rigidity, accuracy and sensitivity necessary to produce small work precisely and in volume.

LONG RUNS . . .



The Hendey 4C Manufacturing Lathe has a wide range of spindle speeds that will assure the most efficient cutting action whether the tool is carbide, stellite, or HSS. Other features, such as a large multiple disc clutch and a cone brake for split second starting and stopping, and convenient, simplified controls for easier operation insure high speed, quantity production, with maintained accuracy.

All these and more can be handled by the Hendey 4C Manufacturing Lathe. It is designed to be a versatile, precise and fast producer and will fulfill your production requirements, whether the work is large or small, or whether it is a simple turning or multiple threading job on a long or short run basis. Complete details and specifications are contained in the 4C catalog—it will be worth your while to write for it today.

The Hendey Machine Company

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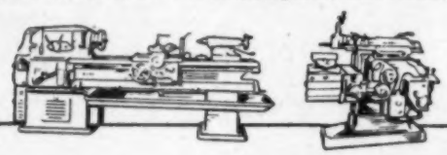
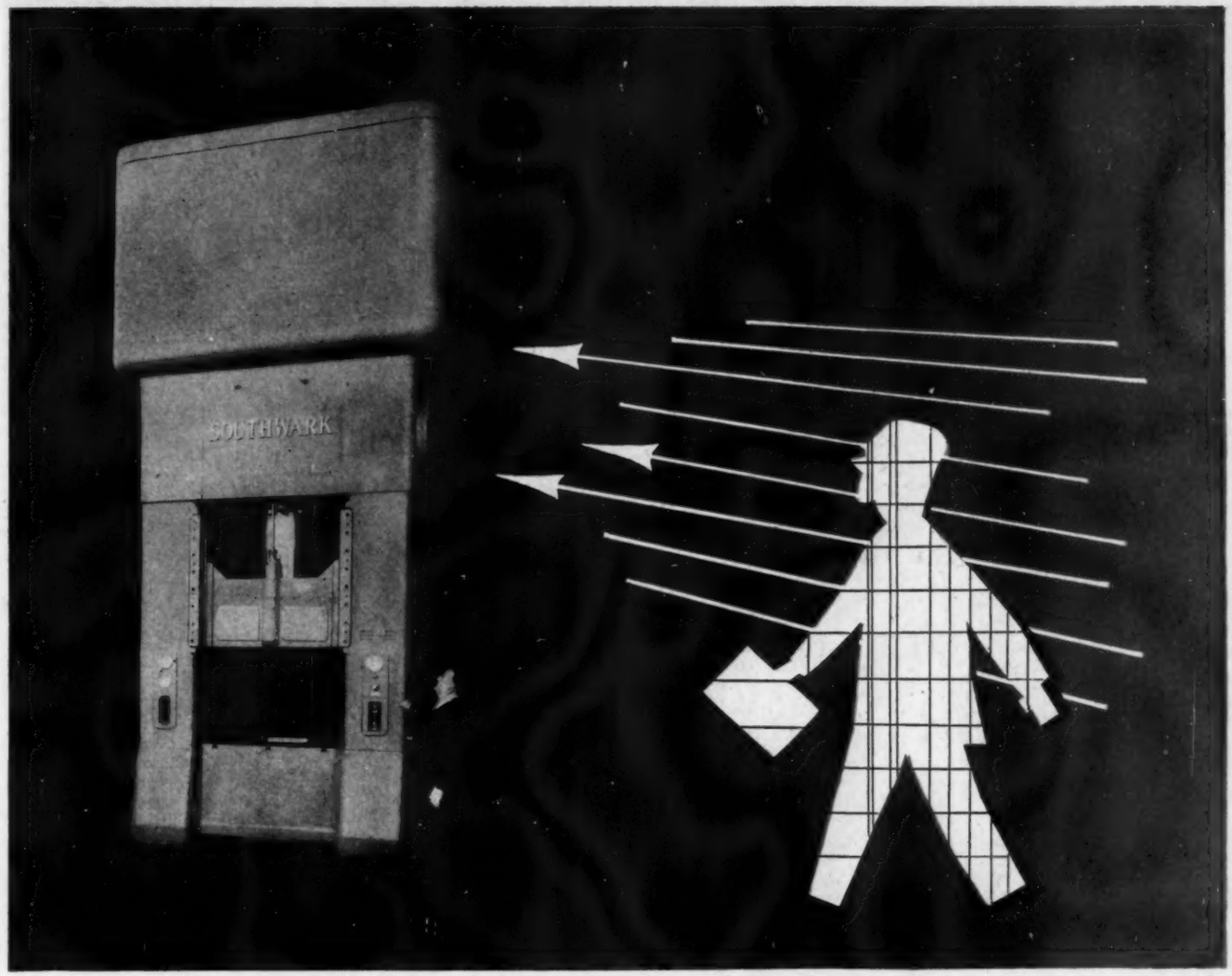


TOOL ROOM LATHES
12" - 14" - 16" - 18" - 20"

SHAPERS
12" - 16" - 20"



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with a *BALDWIN HYDRAULIC PRESS*

When you consider your next press, remember this: Southwark hydraulic presses are designed not only to make good *products* for you . . . but to make good *profits* for you.

Almost any press can show a return while demand is high . . . but when competition is keen, it's the extra margin of performance *from a press exactly suited to the job* that keeps you in the black.

You'll find, at Baldwin, a *Standard line of modern presses* with features and advantages that you would ordinarily expect only in *custom-built* equipment. You'll find a range of sizes that takes care of a wide variety of production needs. You'll find representatives that understand your problems, and that can work with you in applying the proper press to the proper job. You'll find the engineering talent and experience of one of the country's oldest and largest press manufacturers always on call.

We'll be glad to talk over the profit possibilities of Baldwin presses with you at your convenience.

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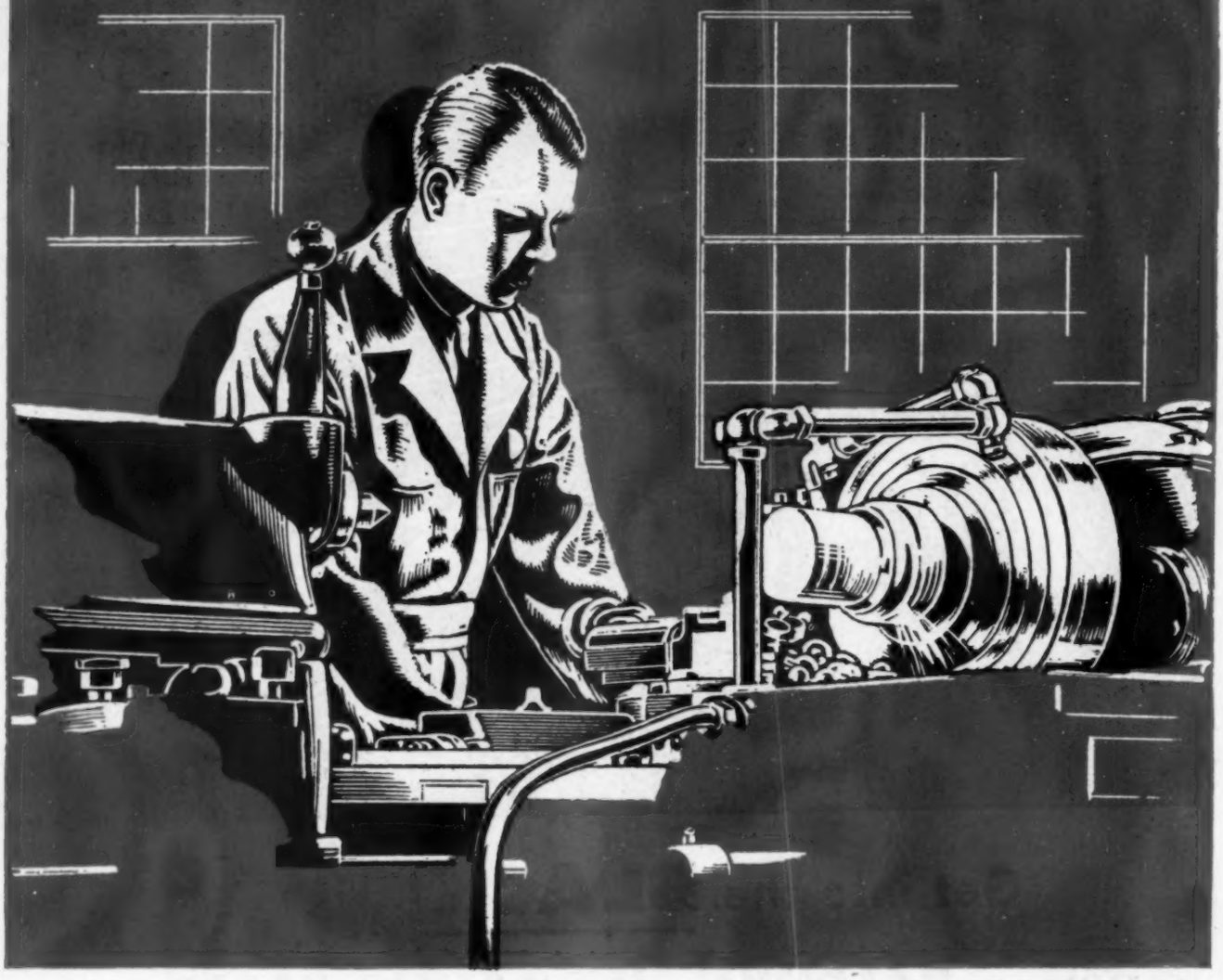

when we switched to Tycol dual-purpose oils

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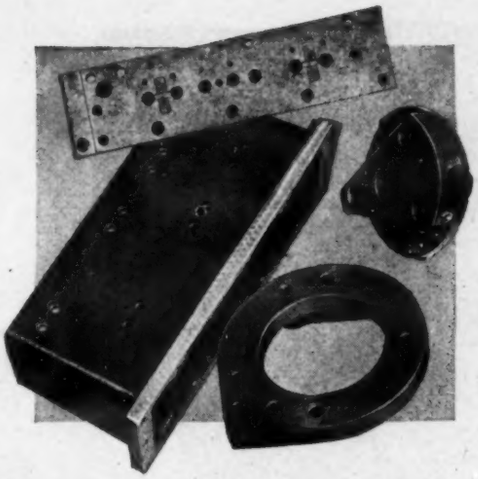
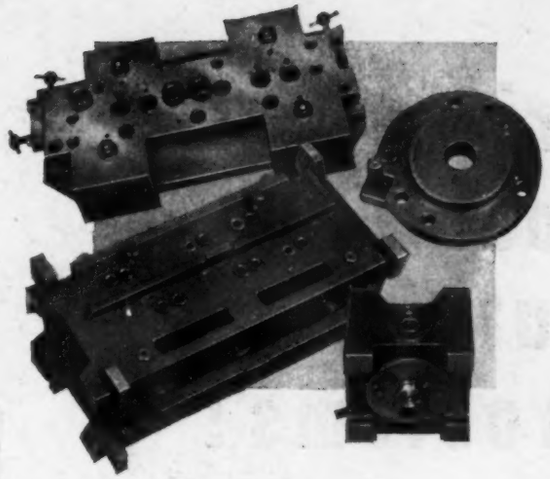
Increased tool life 3 times . . .
Jumped production 25% . . .
Improved finishes . . .
Excellent machine lubricant . . ."

—is how the superintendent of a large manufacturing plant described a few of the advantages of Tycol Dual-Purpose Oil. "As a matter of fact," he said, "this oil *not only* does the work of *two* separate cutting and lubricating oils—but does it *better*"!

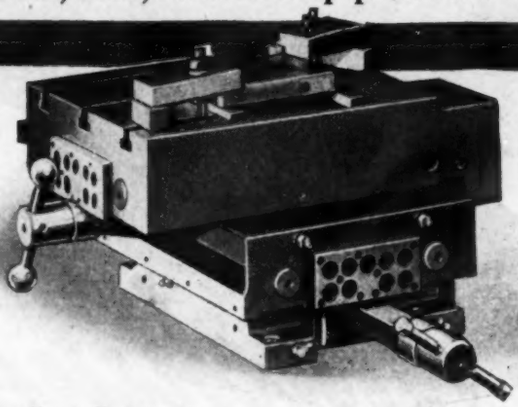
For complete data on Tycol "Dual-Purpose", get in touch with your nearest Tide Water Associated office today.

LUBRICATION—"ENGINEERED TO FIT THE JOB"





Drill, bore, ream or tap pieces like these . . . eliminate jigs like these

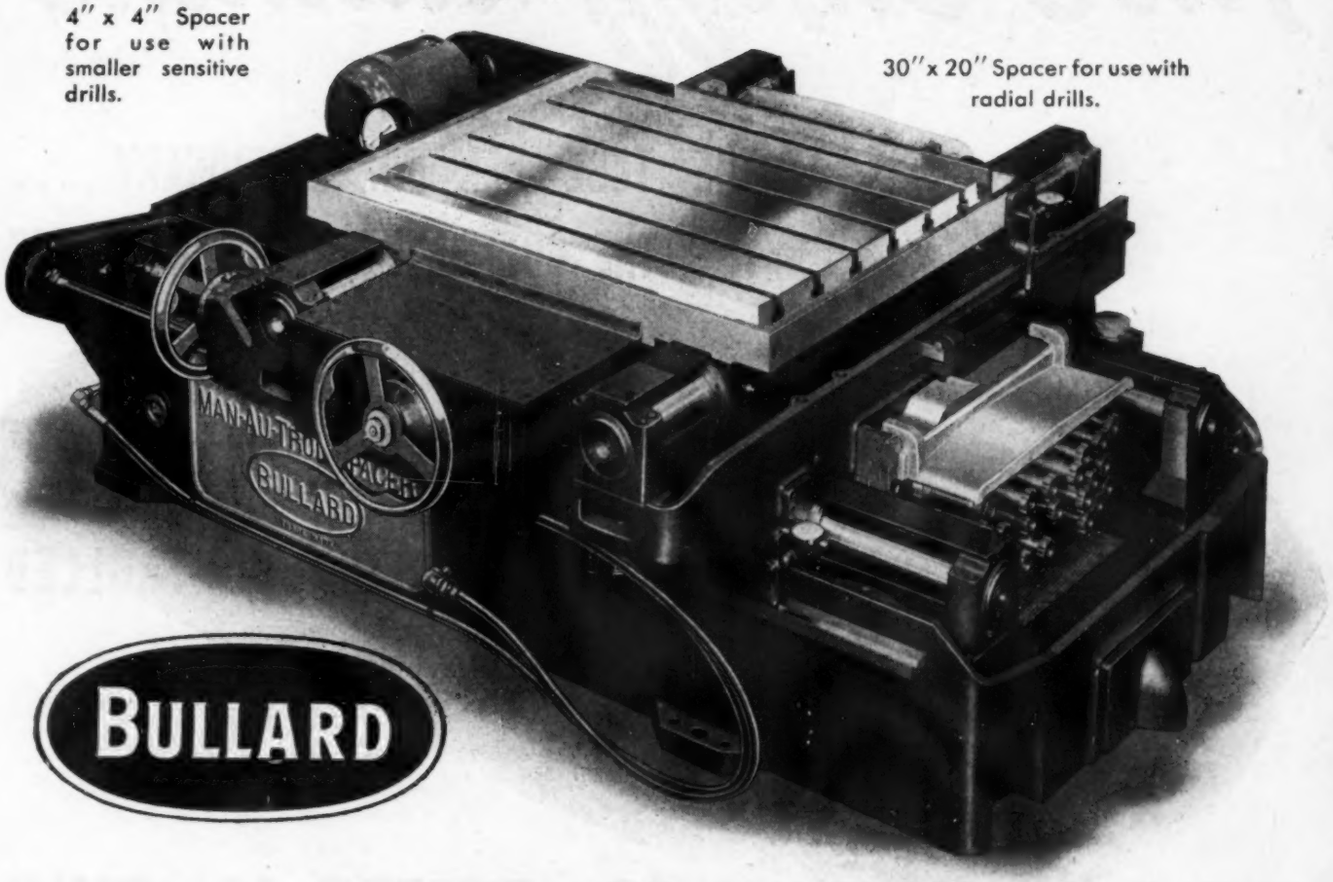


...with Bullard Man-Au-Trol Spacers

With these semi-automatic positioning tables replacing most of your hole-locating jigs, you can speed production... reduce costs... lessen operator fatigue. Write for the new Man-Au-Trol Spacer Bulletin. The Bullard Co., Bridgeport 2, Conn.

4" x 4" Spacer for use with smaller sensitive drills.

30" x 20" Spacer for use with radial drills.



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BULLARD CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

Bring on Your Tube Cutoff Problems!

ETNA

Tube Cutoff Machine

THE TUBE REMAINS STATIONARY .... IT'S THE CUTTER HEAD THAT ROTATES

•

The entire cutoff cycle—clamping of tube, cutting off and unclamping is completely automatic.

SINGLE PUSHBUTTON CONTROLLED

What are you doing about tube cutting

?

THE ETNA MACHINE CO., TOLEDO 10, OHIO

Gairing Standard THREADED HOLDER showing Adjustable Stop Nut
Gairing Standard CORE DRILL with Interchangeable Cutter
Gairing Standard type C COUNTERBORE with Interchangeable Cutter and Pilot
Gairing Standard Block-Type BORING BAR showing "quick-change" Cutter Block

Just off the Press -

Send now for this handy booklet showing the complete line of Gairing standard tools.

These and many more, the whole line of standard cutting tools made by GAIRING, are now completely described and shown in the new *Gairing Standard Tool Catalog.*

All these are tools of general application, made in standard designs and generally available from stock. All are based on the economy principle of interchangeable cutters and some of them have been made by us for as long as thirty years.

Completely catalogued are: interchangeable counterbores, threaded holders, full floating holders, tungsten carbide tipped counterbores, back spotfacers, core drills, micro-nuts and hollow mills. A few pages are devoted to an introduction of the block-type boring tools and some of the more generally used special tools like multi-diameter cutters, carbide-tipped cutters and milling cutters.

30th

THE GAIRING TOOL COMPANY

21226 Hoover Road
DETROIT, MICH.

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"Built in" *Fractional Grades* in *any* size Bay State grinding wheel provides a wider range for a more precise selection. This exclusive Bay State development produces wheels of *three* distinct degrees of hardness within the range of one normal grade.

If your present grinding wheels don't quite "fit" (slightly hard or soft), Bay State Fractional Grades is the answer. Try them.

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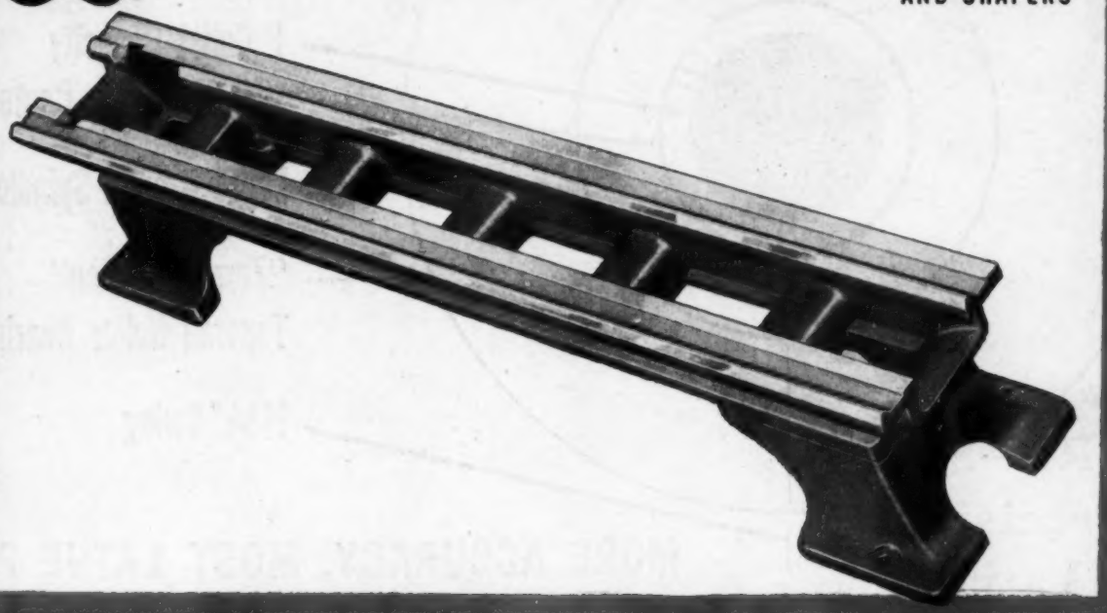
BAY STATE ABRASIVE PRODUCTS CO. • WESTBORO, MASSACHUSETTS, U.S.A.

Logan

A NAME TO REMEMBER WHEN YOU THINK OF **BETTER** LATHES AND SHAPERS



BED WAYS WITHIN .0005″ OF PARALLELISM

Another reason for the accuracy of Logan Lathes

Logan Quick Change Gear Manufacturing Turret Lathe

SPECIFICATIONS COMMON TO ALL LOGAN LATHES . . . swing over bed, 10½″ . . . bed length, 43⅛″ . . . size of hole through spindle, 2⅝₃₂″ . . . spindle nose diameter and threads per inch, 1½″—8 . . . 12 spindle speeds, 30 to 1450 rpm . . . motor, ½ hp, 1750 rpm . . . ball bearing spindle mounting . . . drum type reversing motor switch and cord . . . precision-ground ways, 2 V-ways, and 2 flat ways.

On specially designed machines the V-ways and flat ways of Logan Lathe beds are machined and then precision ground to within .0005″ of parallelism. At every point along the ways carriage and tailstock are in precise alignment with the headstock, and movement in any direction is in a true parallel to the axis of the ball bearing mounted Logan spindle. Moreover, the Logan bed stays accurate. The casting used is specially alloyed to assure the finest lathe bed characteristics. It is extra heavy, with oversize ribs and balanced sections of even thickness that neutralize internal stresses. Thorough seasoning before and between machining operations makes the bed warp-free. In brief, The Logan Lathe bed is another example of the advanced design and careful construction that make Logan Lathes accurate and dependable in the tool room or on the production line. Ask your Logan dealer, or write direct for full catalog information on Logan Lathes and Logan Shapers.

P-1

LOGAN ENGINEERING CO. CHICAGO 30, ILLINOIS

SHELDON

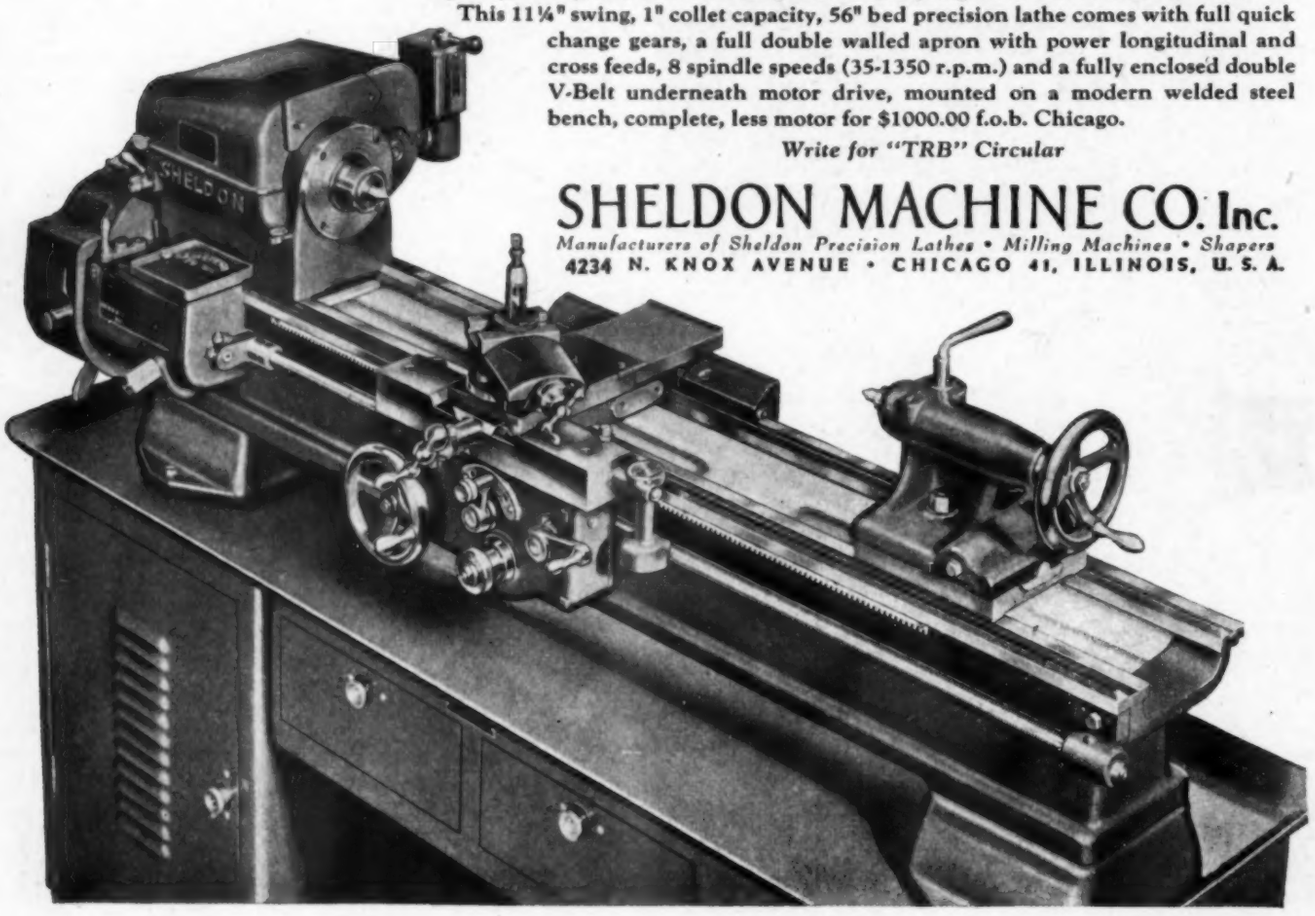
New
TRB–S56
Precision
Lathe
$1000.00

MORE ACCURACY, MOST LATHE PER $

No other moderate priced lathe and but a few of the most expensive, have the "Zero Precision" tapered roller spindle bearings, have beds and ways or lead screws held to such close tolerances. In standard quality tool features, no other lathe can offer as much capacity, utility, and convenience per dollar, as you get in the new Sheldon TRB-S56.

This 11¼" swing, 1" collet capacity, 56" bed precision lathe comes with full quick change gears, a full double walled apron with power longitudinal and cross feeds, 8 spindle speeds (35-1350 r.p.m.) and a fully enclosed double V-Belt underneath motor drive, mounted on a modern welded steel bench, complete, less motor for $1000.00 f.o.b. Chicago.

Write for "TRB" Circular



SHELDON MACHINE CO. Inc.

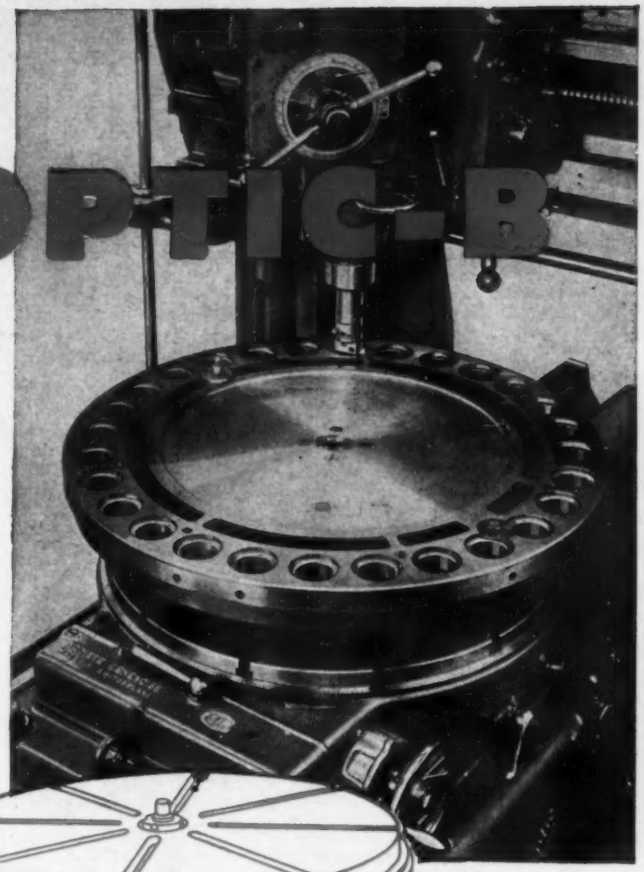
Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers

4234 N. KNOX AVENUE • CHICAGO 41, ILLINOIS, U. S. A.

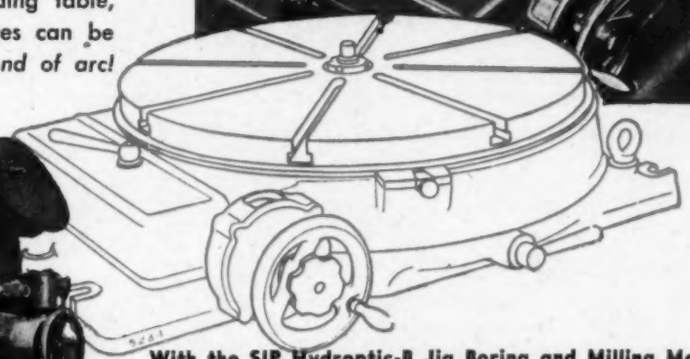
LOCATING AND BORING 28 PRECISION HOLES WITHIN 1 SEC. OF ARC ON THE

SIP HYDROPTIC-B

-no preliminary laying out! -no jigs or fixtures!



All 28 holes on the part shown at the right were bored at one setting on the SIP Hydroptic-B . . . without jigs and without preliminary laying out! The unique optical setting feature of the SIP Hydroptic-B Jig Boring and Milling Machine permits laying out in rectangular coordinates to within 0.0002" limits of accuracy of setting of table and spindle. And, with the circular dividing table, work dimensioned in polar coordinates can be located accurately to within *one second of arc!*



With the SIP Hydroptic-B Jig Boring and Milling Machine, work can be located, drilled, bored or milled without preliminary laying-out. More than a Jig Boring machine, the Hydroptic-B is used profitably for direct production work where highest standards of accuracy must be maintained. More than a Jig Boring machine, the Hydroptic-B is also a measuring instrument of unquestioned accuracy, and as such it can be used dependably to check its own work. Its automatic hydraulic table feeds and its wide range of spindle speeds make highest precision operations possible at production speeds. The construction of the Hydroptic-B assures the maintenance of superlative accuracy, even under heavy table loads. In addition, the optical measuring system, consisting of high precision standard scales read through protected microscopes, is free from wear and mechanical stress. Write for further details of the SIP Hydroptic-B and other SIP Jig Boring Machines.

RANGE OF TABLE SIZES

No. 2C	18" x 10¾"
No. 2H	27½" x 12½"
No. 3K	20½" x 15"
No. 4G	27½" x 23⅝"
Hydroptic-B (illustrated)	39½" x 32"

We also represent in the United States other World-famous Swiss high-precision equipment: Andre Bechler, Mikron, Safag, Studer, Sallaz, Schaublin, Lienhard, as well as Societe Genevoise d'Instruments de Physique (SIP).

HIGH PRECISION MACHINE TOOLS AND MEASURING INSTRUMENTS

COSA CORPORATION

COSA

CHRYSLER BUILDING
New York 17, New York

GEMCO multi-purpose SHAPERS

have the FEATURES that are important to YOU

CONTROLS All dials, levers, push buttons, handles centralized for greatest possible convenience to the operator. Speed production.

COLUMN Advanced design, with exceptional weight, assuring maximum stability for heavy cuts, high speed operation.

RAM Of high-tensile semi-steel, is deep, massive, and internally ribbed to resist distortion under load.

ROCKER ARM Strongly ribbed and braced, made of high-tensile semi-steel; carries extra large hardened and ground alloy steel crank block in its highly finished sliding surface.

BULL GEAR DRIVE Twin type, for long life; in such combinations that gear noise is minimized and chatter marks are obviated on work-piece.

TRANSMISSION Entire gear drive located within the column; main shaft carries disc clutch and friction brake, permitting instant starting and stopping of Ram.

BASE Single-piece casting, heavily reinforced giving excellent rigidity for heavy roughing cuts or precision finishing over entire range of feeds and speeds.

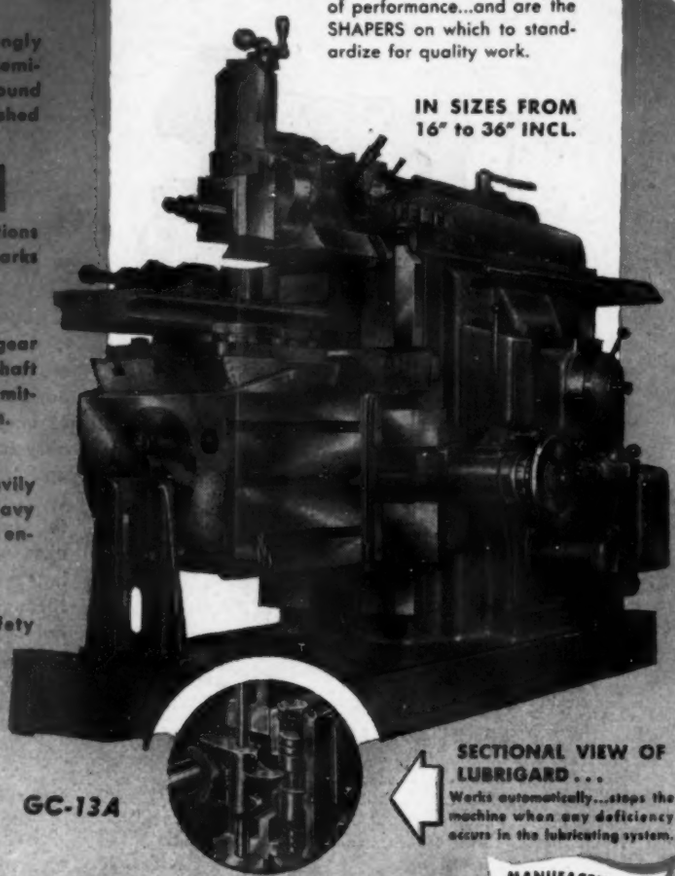
LUBRIGARD Exclusive safety feature found only in GEMCO Shapers, preventing damage to machine through any failure in the lubricating system.

they're **PRECISION** *built for* **PRECISION** *work*

Engineering skill embodied in the design of GEMCO Multi-Purpose Shapers assures their meeting the severity of service to which they are subjected, and insures high precision finish on the work-piece at hand...with ease, speed, and safety, lowering production costs and increasing profits. In three models, Plain, Production and Universal, and in sizes from 16-in. to 36-in. stroke... GEMCO Shapers assure rugged, rigid adaptability to any type job and in any size shop.

Over 30 years of "know how" gained from designing, experimentation, and testing, both in the shop and out on the job, go into the manufacture of GEMCO Shapers. They set a high standard of performance...and are the SHAPERS on which to standardize for quality work.

IN SIZES FROM 16" to 36" INCL.



SECTIONAL VIEW OF LUBRIGARD... Works automatically...stops the machine when any deficiency occurs in the lubricating system.

WRITE TODAY FOR BULLETIN *GC-13A*

MANUFACTURERS OF PRECISION MACHINERY SINCE 1917

GENERAL ENGINEERING & MFG. CO.

☆ ST. LOUIS 16, MISSOURI ☆

One Bonderizing Line TREATS THEM ALL

Bonderizing tames the tough metals, too! The same Bonderite* treatment that prepares steel for a lasting fine finish does the job on zinc and aluminum as well. No special treatment required—a single Bonderizing line produces excellent results on all these metals.

The results are the same on all—a fine, uniform crystalline coating, that takes and holds the final finish, greatly retards flaking and peeling. On steel, Bonderizing guards against rust, on zinc and aluminum, against the corrosion typical of these metals when untreated.

Now manufacturers whose production metals are mixed can have the advantages of Bonderizing with the greater economy of a single finishing line. Write for FREE booklet on Bonderite No. 170.

PARKER RUST PROOF COMPANY, 2196 East Milwaukee Avenue, Detroit 11, Michigan

*Reg. U. S. Pat. Off.

BONDERIZING Holds Paint to Metal · **PARKERIZING** Inhibits Rust · **PARCO LUBRIZING** Retards Wear on Friction Surfaces

PARKER PRODUCTS CONQUER RUST

Talide
(TUNGSTEN CARBIDE)
Cutting Tools

stock immediately available

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We carry complete stocks of standard Talide Tools and Tips at the following warehouses. Call them for fast service:

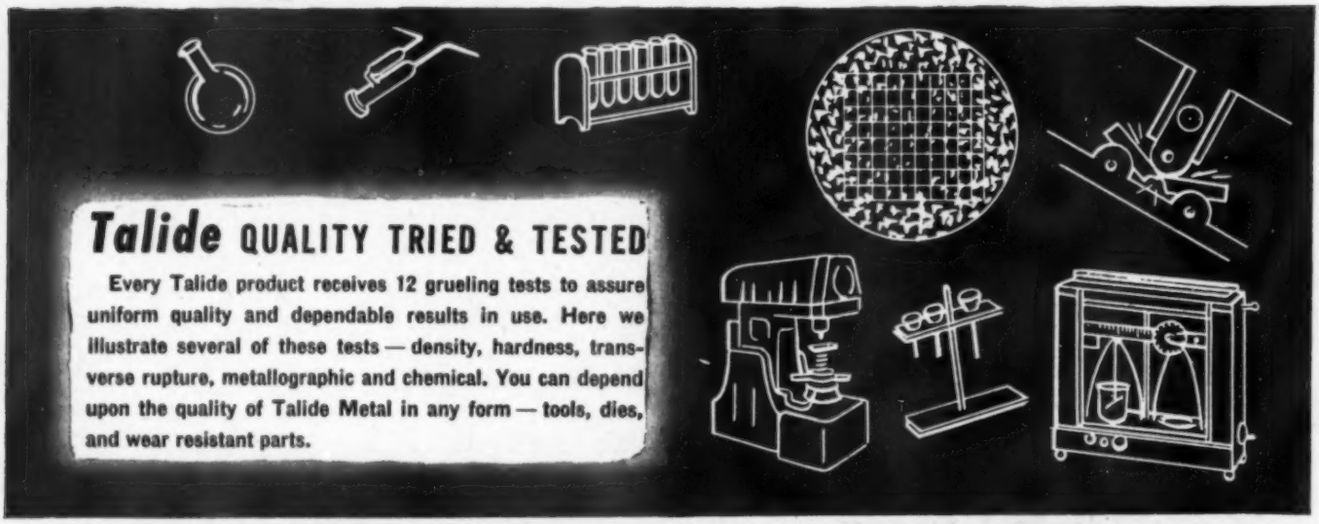
Newark 4, 166 Bloomfield Ave.
Youngstown 5, 107 E. Indianola Ave.
Chicago 22, 601 W. Milwaukee Ave.

We also have Talide sales engineers in the following territories who will be glad to assist you in any phase of tungsten carbide application, or in obtaining stock: Newark, Pittsburgh, Cleveland, Detroit, Indianapolis, and Chicago.

WHY PRODUCTION MEN USE *Talide* CUTTING TOOLS

Talide Tools remove metal 2 to 3 times faster than the fastest tool steel. Made from the hardest man-made metal, they wear much longer, and only require infrequent redressings. You can use Talide Tools for machining all kinds of steel, cast iron, non-ferrous metals and non-metallic materials.

Send for engineering-style catalog 46-T "Standard Talide Tools and Tips."



Talide QUALITY TRIED & TESTED

Every Talide product receives 12 grueling tests to assure uniform quality and dependable results in use. Here we illustrate several of these tests — density, hardness, transverse rupture, metallographic and chemical. You can depend upon the quality of Talide Metal in any form — tools, dies, and wear resistant parts.

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MC TALIDE
HOT PRESSED CARBIDES

METAL CARBIDES CORPORATION
YOUNGSTOWN 5, OHIO *Pioneers in Tungsten Carbide Metallurgy*
CUTTING TOOLS · DRAWING DIES · WEAR RESISTANT PARTS

Toolroom
Republic Drill & Tool Company reduced sharpening cost to $.07 per milling cutter with bench-mounted Dumores, including all depreciation, maintenance, and interest charges.*

Maintenance
Dumore saves $7.00 a day refinishing rotary-press rollers for Atlanta Constitution, and reduces grinding time from 5 hrs. to 3 hrs.*

Cost accountants favor Dumores

and so do production, toolroom, and maintenance men who know how Dumores cut costs in all types of grinding . . .

Production
Dumore at the Hanna Stoker Company grinds I. D. of transmission-fork bushings 3½ times faster than former method, and saves 75% of the previous labor cost.*

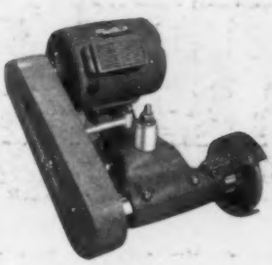
*Cost figures attested by Certified Gould Reports.

If you want to cut your grinding costs, you can profit by the experience of scores of other companies. Versatile Dumore Grinders have established a new high in dependability—and *a new low in costs* —for production, toolroom, and maintenance work. They do all five types of grinding: external and internal cylindrical, surface, tool, and thread grinding.

A Dumore often enables you to avoid an investment in expensive special grinders —

- **by converting basic machine tools — equipment you now have — into dependable precision grinders.**
- **by combining with used machine-tool bases to provide inexpensive, dependable production grinders.**
- **by serving as variable-speed, precision work-heads for special machines or set-ups of your own design.**
- **by operating bench-mounted for off-hand or jig-and-fixture grinding operations.**

Send in the coupon on the next page for your free copy of *Here's How* — a book packed with reports on Dumore's grinding economy in 76 different plants. It gives you one idea after another for cutting costs on your own grinding jobs!



DUMORE
PRECISION TOOLS

Sold by leading distributors in all principal cities.

Turn the page for information on the complete line of Dumore cost-cutting tools and grinders.

7 Different sizes and types of Precision Dumore Grinders

No. 12

— 1 HP; speeds 2800 to 7750 rpm.; wheel sizes — 3" to 8"; for external work and internal to 24" depths.

No. 77

— ½ HP; speeds 3400 to 13,800 rpm.; wheel sizes — 1" to 6"; for external work and internal to 18" depths.

No. 7

— ¾ HP; speeds 4200 to 29,300 rpm; wheel sizes — ⅛" to 5"; for external work and internal to 18" depths.

No. 5

—½ HP; speeds 4600 to 42,500 rpm.; wheel sizes — ⅛" to 5"; for external work and internal to 18" depth.

No. 44

—¼ HP; speeds 6600 to 38,500 rpm.; wheel sizes — ⅛" to 3".

No. 11

— ⅓ HP; speeds 6900 to 30,000 rpm.; wheel sizes — ⅛" to 3".

No. 14

—1/14 HP; speeds 10,000 and 22,500 rpm.; wheel sizes ⅛" to 2"

Dumore distributors stock this complete line to supply you the right Dumore for every grinding job

— and a Dumore is the right tool to reduce grinding costs in production, toolroom, and maintenance work . . .

Every grinder in the complete Dumore line — from the rugged 1 HP No. 12 to the midget, 1/14 HP. No. 14 — is designed and built to deliver the same high degree of accuracy (± .0001"). A Dumore's set-up speed, and adaptability to a variety of different jobs in a single work day, are indispensable in toolroom and maintenance work. Its versatility, accuracy, and sturdy dependability are cost-cutting advantages for production grinding.

Your nearby Dumore Distributor maintains a stock of this complete line. Let him recommend the size and type for your particular requirements.

Send in the coupon below, for your free copy of *Here's How*—Dumore's new 76-page case-study book, showing how 75 different companies have used Dumore tools and grinders to cut their production, toolroom, and maintenance costs.

See preceding page for cost-cutting Dumore grinder applications.

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DUMORE
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Please send me, without obligation, my copy of *Here's How*, your manual of the newest techniques in grinding.

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4 Different Dumore Handgrinders

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— 1/20 HP; speed — 18,000 rpm.; ⅛" capacity chuck or Jacobs No. 0 Chuck, 0 to ⅛" capacity.

No. 10 HG

— 1/10 HP; speed—22,000 rpm.; ⅛" capacity chuck or Jacobs No. 0 Chuck, 0 to ⅛" capacity.

No. 9 HG

— ¼ HP; speed — 15,500 rpm.; ¼" capacity chuck and extension arbor.

Duplex

— 1/14 HP; speed—17,000 rpm.; ¼" capacity chuck with ⅛" and 3/32" adapters; flexible shaft attachment.

Plus

Sensitive Drill

— 1/30 HP; speeds 2000 to 15,000 rpm.; Jacobs No. 0 Chuck, 0 to ⅛" capacity. With foot rheostat to control speed.

No. 2 Flexible Shaft Tool

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"KNOCK-OUT" CHUCKS ARE FAST • POSITIVE • NON-SLIP

A twist of the wrist tightens or loosens this self-energizing chuck. The heavier the work-load the tighter its 3 hardened jaws grip the tool with a radial pressure that prevents twist or slip. Its fast, positive action saves time—saves tools—steps up production.

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SIMPLE—FAST—ACCURATE. "Knock-Out" Expanding Mandrels hold work from $\frac{3}{8}$" to $5\frac{1}{2}$" hole. Perfect support without distortion for thin wall sleeves—sure, positive grip on heavy pieces. Ideal for production or tool-room.

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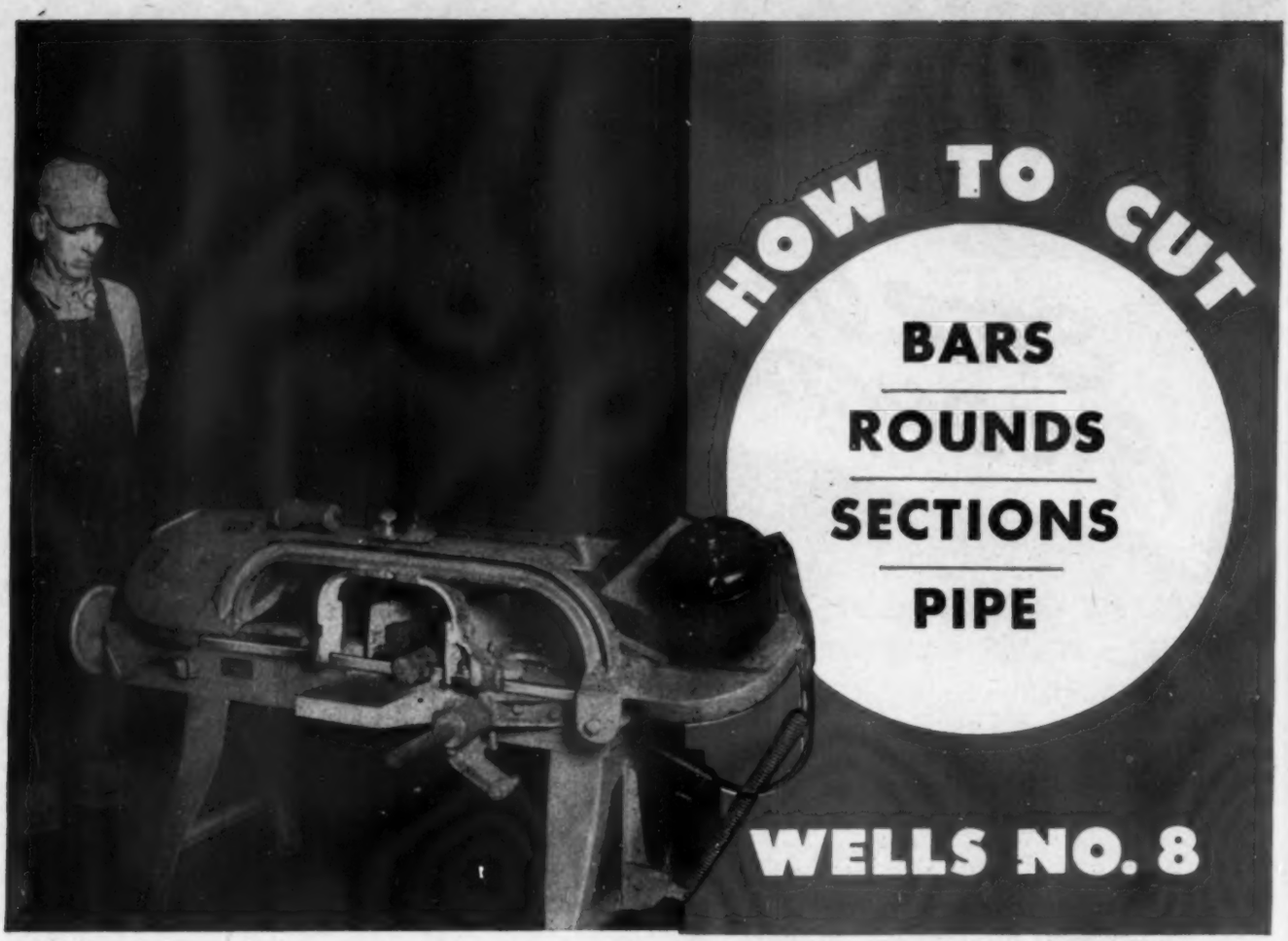

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• If you have a variety of metal cutting jobs—bars, rounds, sections, pipe, tubes—it will pay you to investigate the advantages offered by portable, practical Wells saws. Simple in design and rugged in construction, the Wells No. 8 requires no highly skilled operator or special handling. Powerful, quick-acting vise reduces set-up time to a minimum. Gravity feed and automatic shut-off make it practical for one man to operate two or more Wells saws simultaneously. For production work, your Wells can be equipped with the new Wells Wet Cutting System for faster cutting and longer blade life. Ask for the complete story. Literature and quotations on request.

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Rectangular . . . . . 8"x 16"
(Special Guides) . . . . . 5"x 24"
ROUNDS: . . . . . 8" diameter
MOTOR: . . . . . ½ H. P., A. C. or D. C.
SPEEDS:
Selective 60, 90, 130 feet per minute
WEIGHT: . . . . . Approximately 665 lbs.

Wells SAWS

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
505 ROOSEVELT RD., THREE RIVERS, MICH.

ATKINS Silver Steel BLADES
FROM 154 Sec. to 80 Sec.!
On Dural extrusion, cutting time was cut almost in half by replacing previous blade with Atkins "Curled-Chip" Power-saw Blade.
LESS THAN HALF THE TIME!
On Johnson Bronze, Atkins "Curled-Chip" Blades reduced cutting time by more than 50% . . . eliminated need for re-machining.
5" DIA.
1½"
OVER 50% FASTER!
On Dural extrusion, Savings of over one-half in cutting time were realized when change-over to Atkins "Curled-Chip" Blades was made.
8"
1
3
⅝
⅜
ATKINS Silver Steel SAWS
400
A-Z Set

For Unusual Results on Unusual Jobs

Similar Results With Atkins Metal Cutting Bands

ATKINS METAL BAND SAWS are worthy members of the famous Atkins family of metal cutting saws. Fast and keen cutting—rugged and specially tempered—they are available in a full range of sizes, tempers and tooth spacings.

These records emphasize that the impressive cutting ability of Atkins "Silver Steel" Blades is not limited by types and shapes of metal. They are typical of scores of similar reports showing comparable or even more spectacular performance.

They prove that simply changing blades can effectively change cutting time for the better. This is highly significant to *you*. For it opens the door to higher production at lower costs, with less downtime—decreased tool costs—*real* savings in the face of today's many unreal conditions.

Let an Atkins Engineer show you—on the material and the work you choose—that Atkins Blades assure unusual results on any cutting job. Write for details today.

IMPORTANT TO USERS

Atkins "Silver Steel" Hacksaw Blades will perform with complete satisfaction, when used with any tensioning device now being marketed.

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OLIVER Ace
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"More accurate, faster and most economical machine in the plant," states Beaver Tool and Engineering Co.

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IT'S THE BACKBONE OF PRODUCTION
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AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS—DRILL POINT THINNERS—TEMPLATE TOOL GRINDERS—FACE MILL GRINDERS—REMAKING MACHINES

. . . for work of superior quality
***use the* No. 101 "PRODUCTION"**

This fast, simple and automatic machine requires no centering, chucking or holding of work. It is fed automatically, assures better finishing at lower cost, and is adaptable to polishing, finishing and buffing any cylindrical work.

The No. 101 is substantially built and is equipped with device for turning wheels while in motion and with adjustable work support. Parts are guarded yet accessible. Suitable for cylindrical work ¼" to 6" diameter. Available also in Tandem Type for multiple finishing.

Write for illustrated literature

Production
MACHINE COMPANY GREENFIELD, MASSACHUSETTS, U.S.A.

If you have a SPECIAL PROBLEM
in any of these operations, where precision work is demanded and where greater production at man-hour savings is paramount—

• BORING—rough, semi-finish and finish • MILLING (special types) • STRAIGHT LINE DRILLING • UNIVERSAL ADJUSTABLE SPINDLE DRILLING • HONING • TAPPING • REAMING • COUNTERBORING • VERTICAL AND WAY-TYPE EQUIPMENT

then a Moline Multiple Spindle Specially Designed machine tool is your answer. Moline tools are ruggedly built and engineered to fit your PARTICULAR requirements, they're made to last for years, they're easy to change over to other jobs, they do better work at less cost and stand up to it longer.

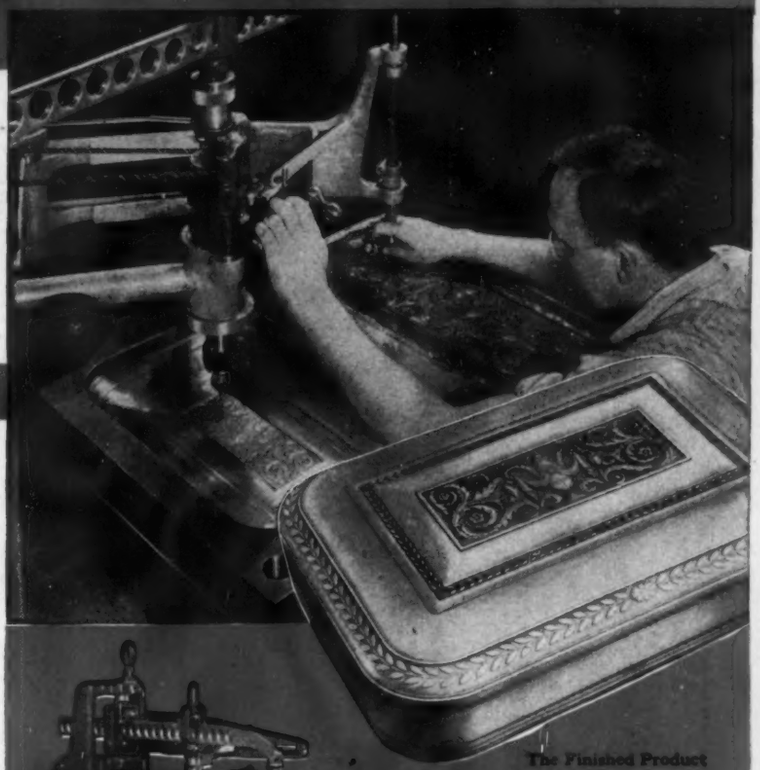
For YOUR special problem, go "HOLE-HOG," write us for any information you may need.

MOLINE TOOL CO.
HOLE-HOG
MOLINE, ILLINOIS

MOLINE TOOL CO.
100 20th Street Moline, Illinois

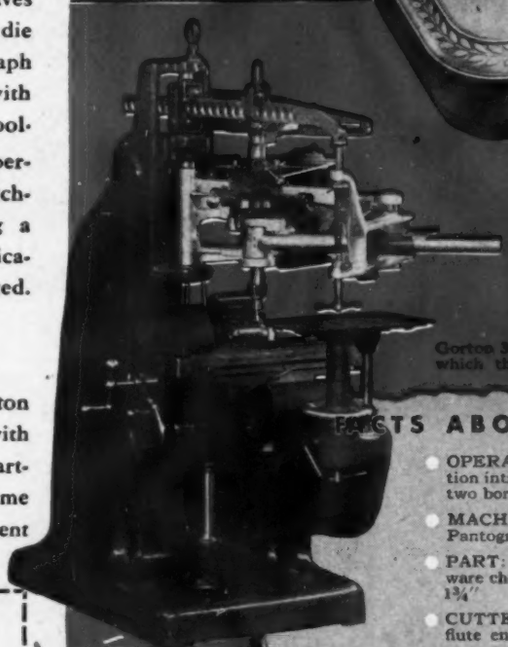
Cut Machining Costs

with GORTON Tracer Control



The Finished Product

Illustrated—distinctively designed cameo Silverware Chest in Ivory Plastic. For further details, write Marshall-White Co., 426 S. Clinton St., Chicago, Illinois.



Gorton 3-L Pantograph on which this job was done.

For Precision Machining on Work of Various Sizes

Beautiful plastic chests such as the one shown here are made possible by the painstaking and highly skillful craftsmanship of the engraver who engraves a master model which is then transformed into a die or mold through the use of a Gorton Pantograph with Tracer Control which mills or engraves with true fidelity every mark of the original engraver's tool.

Tracer Controlled Milling is our term for Super-Speed precision milling, engraving, electrical etching or other metal removal operations using a Master pattern. There are many profitable applications for which this method is specifically indicated. It will pay you to investigate now.

Gorton Pre-Determines Results For You

Find out today if you can save money with Gorton Tracer Control. Send us a complete description with prints of one of your jobs. Our Engineering Department will prepare a production estimate on the same job tooled on Gorton Tracer Controlled equipment —no obligation.

FACTS ABOUT THIS JOB

- OPERATIONS: Mill at 2 to 1 reduction intricate design in center panel and two borders.
- MACHINE: Gorton 3-L 3-dimensional Pantograph.
- PART: Mold for top of Plastic silverware chest; mild steel, 17⅝" x 12³⁄₁₆" x 1¾"
- CUTTERS: Gorton single and multi-flute end mills.
- SPINDLE SPEED: 7400 R.P.M.
- TIME: Total time including setting-up, cutter grinding and milling was 120 hours—a tremendous saving over any other method.

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GORTON

2-A

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Tracer Controlled Milling

1503 RACINE STREET • RACINE, WISCONSIN, U.S.A.

ROTO-FINISH parts mechanically— and you de-burr automatically!

1 FINISHING
2 DE-BURRING
} ROTO-FINISH

TWO operations in one are performed by Roto-Finish. This mechanical method not only finishes and colors surfaces but likewise, removes burrs from edges, smoothes sharp corners.

Roto-Finish steps up production by combining these two jobs and eliminating hand labor. It likewise cuts costs by saving man hours. Roto-Finish processes parts of aluminum, brass, magnesium, steel, stainless steels, and die cast alloys. It finishes parts for plating weighing a fraction of an ounce and up.

Take advantage of our offer to process your parts and furnish complete information. No obligation. THE STURGIS PRODUCTS CO., 704 Jacobs Street, Sturgis, Michigan.

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THE UNIFORM MECHANICAL PROCESS—
FOR GRINDING • DE-BURRING • POLISHING • HONING • COLORING

M & N HYDRAULIC HOBBING PRESSES

. . . for accuracy in heavy duty die work

These precise, heavy duty, compact and completely controlled Hobbing Presses offer exclusive features which adapt them to the needs of up-to-date tool rooms and progressive mold shops.

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Strand Flexible Shaft machines provide constant speeds with greater operator convenience. Hundreds of attachments easily interchanged—125 types and sizes—models include vertical and horizontal type machines from ⅛ to 3 h.p. Distributors in all principal cities.

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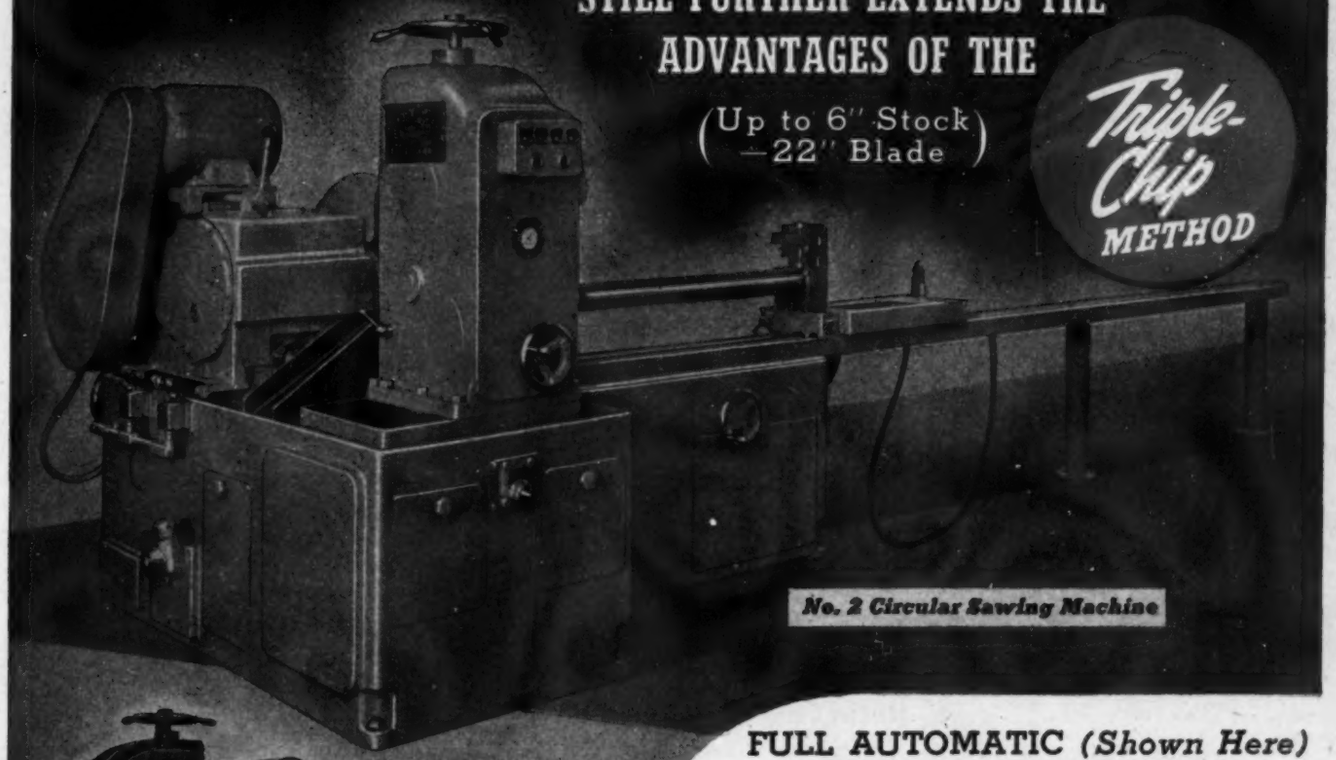
Now— THE No. 2 MOTCH & MERRYWEATHER CIRCULAR SAWING MACHINE

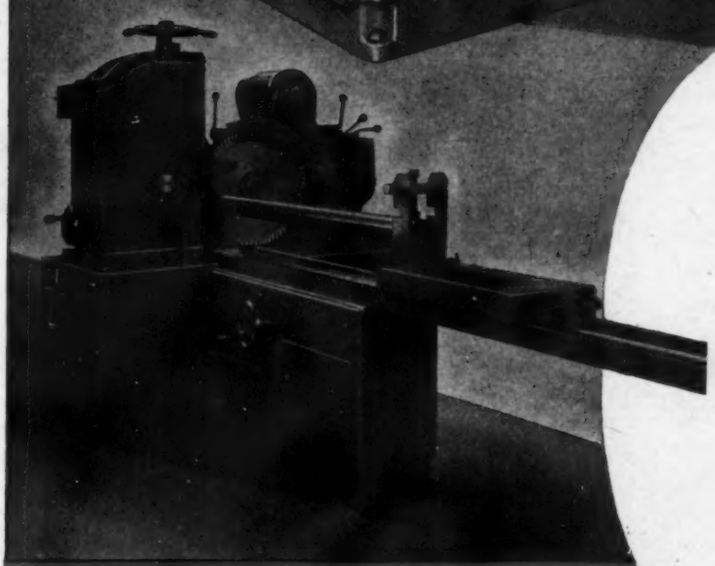
STILL FURTHER EXTENDS THE ADVANTAGES OF THE

(Up to 6" Stock —22" Blade)

Triple-Chip METHOD



No. 2 Circular Sawing Machine



FULL AUTOMATIC *(Shown Here)* OR MANUAL MODEL

In the No. 2 Motch & Merryweather Circular Sawing Machine you find all the advantages of the Triple-Chip Method, together with features exclusive to this Model. You get positive hydraulic clamping on both sides of the saw blade; sufficient feeds and speeds for cutting off all kinds of material; a stock stop built into the automatic feeder to give quick adjustment and increased accuracy; controls grouped on a convenient panel. Also, all Triple-Chip advantages: high production, lengths accurate and uniform, burrless ends, practically no maintenance, long service.

Ask for full details ... a Motch & Merryweather sales engineer.

Only M&M builds ALL 3: COLD SAW SAW BLADE BLADE GRINDER

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Yes, Haskins portable tools are *first* in the shop—and *first* in the front office where cost records prove their negligible maintenance cost, their year-after-year usefulness under tough, high-production conditions.

If flexible shaft machines could help solve *your* production, think of Haskins, *first!* Send for details. R. G. Haskins Company, 2641 W. Harrison Street, Chicago 12, Illinois.

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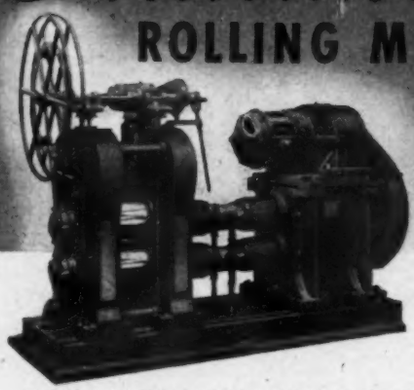

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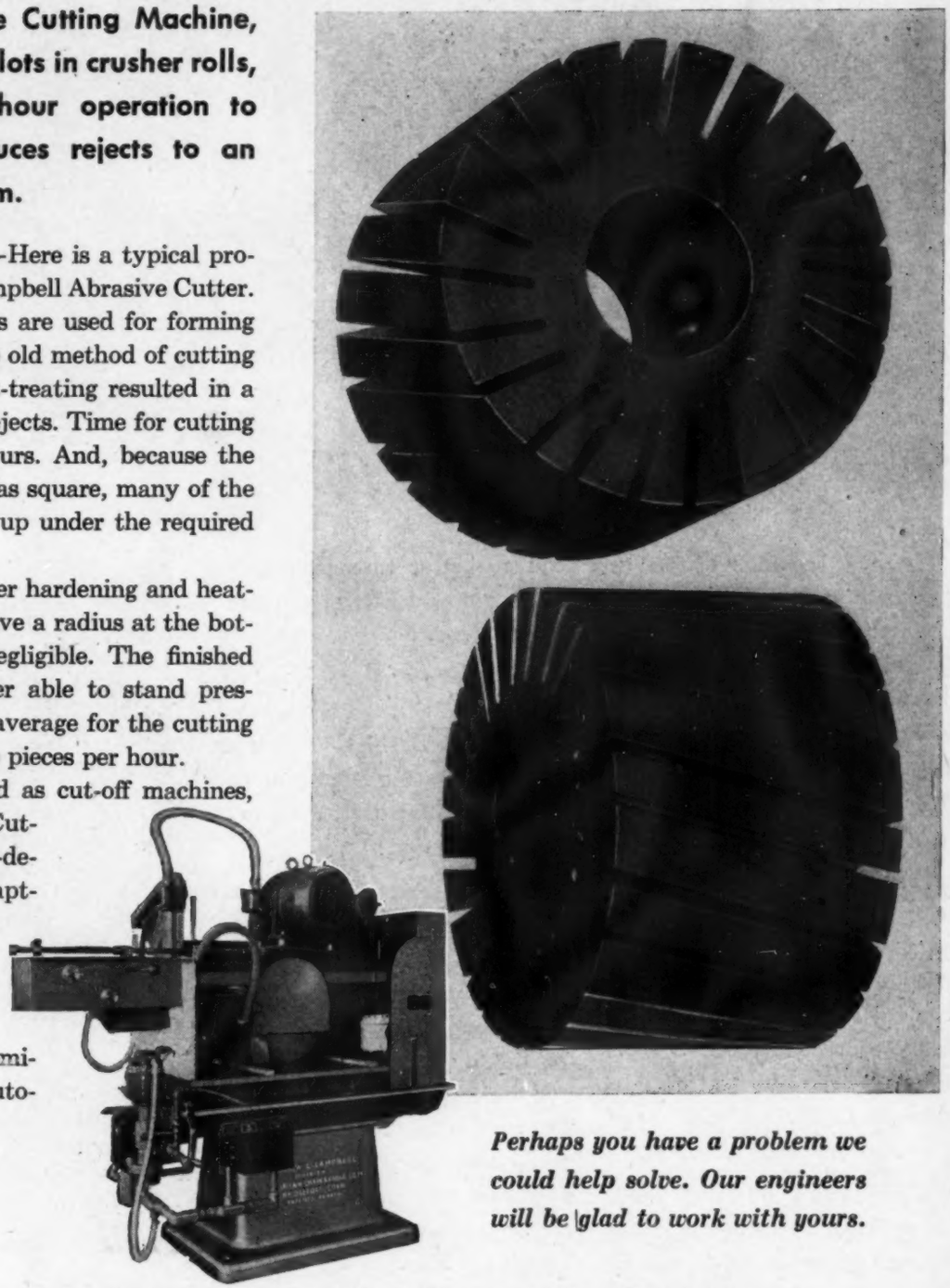
Campbell Abrasive Cutting Machine, used for cutting slots in crusher rolls, reduces a two-hour operation to 25 minutes—reduces rejects to an absolute minimum.

BRIDGEPORT, CONN.—Here is a typical production job for a Campbell Abrasive Cutter.

These crusher rolls are used for forming grinding wheels. The old method of cutting the slots before heat-treating resulted in a high percentage of rejects. Time for cutting 22 slots, about 2 hours. And, because the bottom of the slot was square, many of the rolls failed to stand up under the required high pressure of use.

Cut abrasively after hardening and heat-treating, the slots have a radius at the bottom. Rejects are negligible. The finished rolls are much better able to stand pressure. And the daily average for the cutting operation is now two pieces per hour.

Originally designed as cut-off machines, Campbell Abrasive Cutters with Campbell-designed fixtures are adaptable to many production machining operations. The Campbell line includes manual, semi-automatic and full automatic machines.



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3.6 seconds

TAPPING TIME: ~~12.5~~ SECONDS

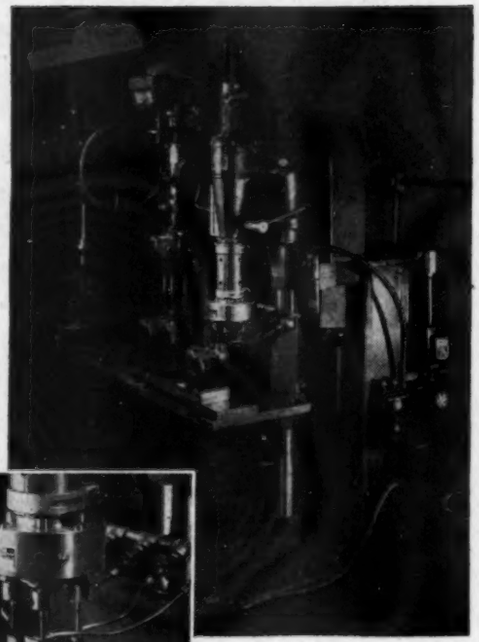
Cylinder castings of Briggs & Stratton air-cooled gasoline engines have four 5/16" 24 thread tapped holes on one side. Tapping the four holes individually required 12.5 seconds plus 12 seconds loading and unloading time.

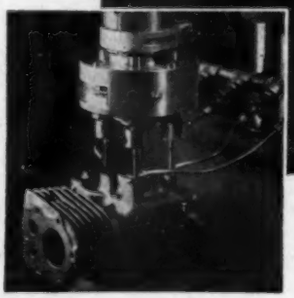
Today, all four holes are tapped simultaneously on a Cleveland Lead Screw Tapping machine with a multiple tapping head on a 3.6 second tapping cycle. Allowing the same loading and unloading period, total time has been reduced from 24.5 seconds to 15.6 seconds — and there are no "missed" holes.

Cleveland's positive lead-screw feed, operator-controlled coolant system and rigid spindle design not only make this important saving possible but also produce better threads, eliminate scrapped castings and cut tap breakage to a new low.

This is one of the many instances in which Cleveland's greater precision, high efficiency and accurate depth control is helping manufacturers meet today's higher costs.

There is every possibility Cleveland engineers can point the way to equally important savings on your drilling and tapping jobs. For their recommendations, send your prints and specifications or sample parts to The Cleveland Tapping Machine Company, Hartville, Ohio, U.S.A.





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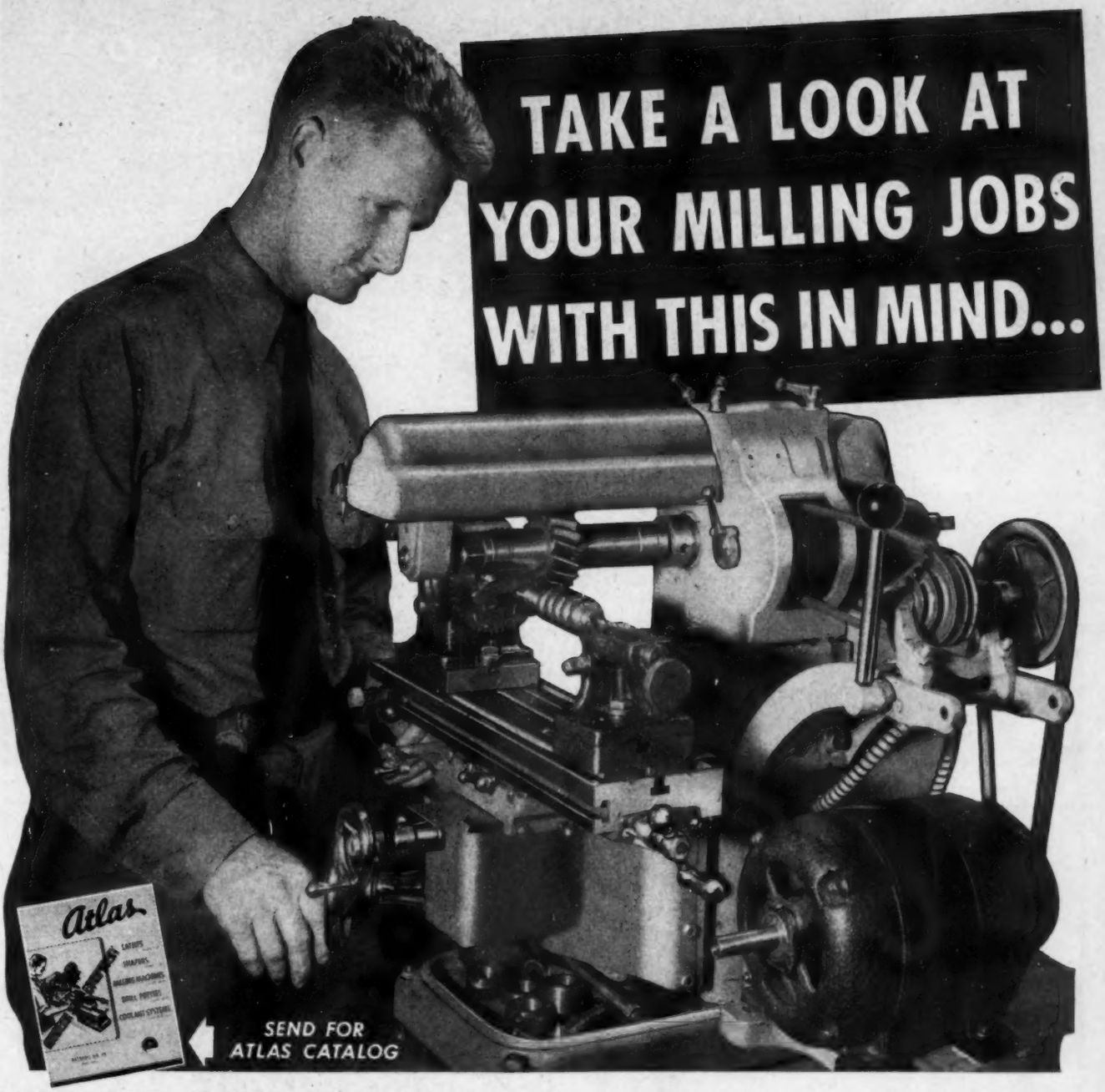
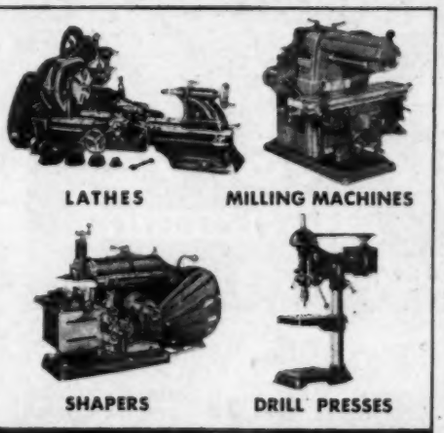
CLEVELAND
lead screw
tapping machines

TAKE A LOOK AT YOUR MILLING JOBS WITH THIS IN MIND...





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Milling costs can be cut—despite higher labor rates. Use your *big machine* for *big work.* Install Atlas millers to *take over all small parts production.* You save set-up time, save power, save tremendously on equipment cost.

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Part: CAMBER ADJUSTING ECCENTRIC (front wheel)
Thread: ¾"-10 NC2 (on each end) 1"-7 Acme Thread (Double Lead—Left Hand)
Material: Hot Rolled Steel

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For complete specifications, write for Bulletin A22-1.

Prove it to your own satisfaction! Send us specifications of your work and let us roll samples. We will furnish production estimates and equipment costs.

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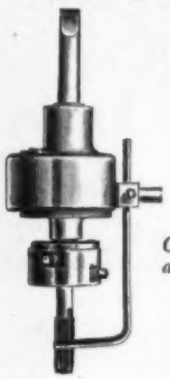
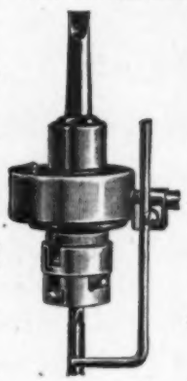
" 00	⅛"
" 0	5/16"
" 1	7/16"
" 2	9/16"
" 3	5/8"
" 4	¾"
" 5	¾"

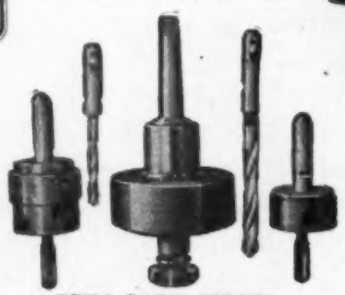
	⅛"
	½"
	¾"
1 "	
1¼"	
1½"	
2 "	





Our High Speed Tappers are Super-Sensitive for Small Tapping

Style B Positive Stop Holds Work Down



Style C Graduated Adjustable Safety Friction

DRILL PRESS TURRET
Style D-E with Quick-Change Tool Holders to Drill, Tap and Set studs, etc., without moving work, or stopping or reversing machine. Individual friction adjustment in each tapholder. If required.
Also, Opening Die-Heads; Opening Stud-Setters; Friction Screw-Drivers and Nut-Setters, etc.

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No. 1½	HAND FEED SURFACE GRINDER	**No. 3B**	AUTOMATIC FEED SURFACE GRINDER

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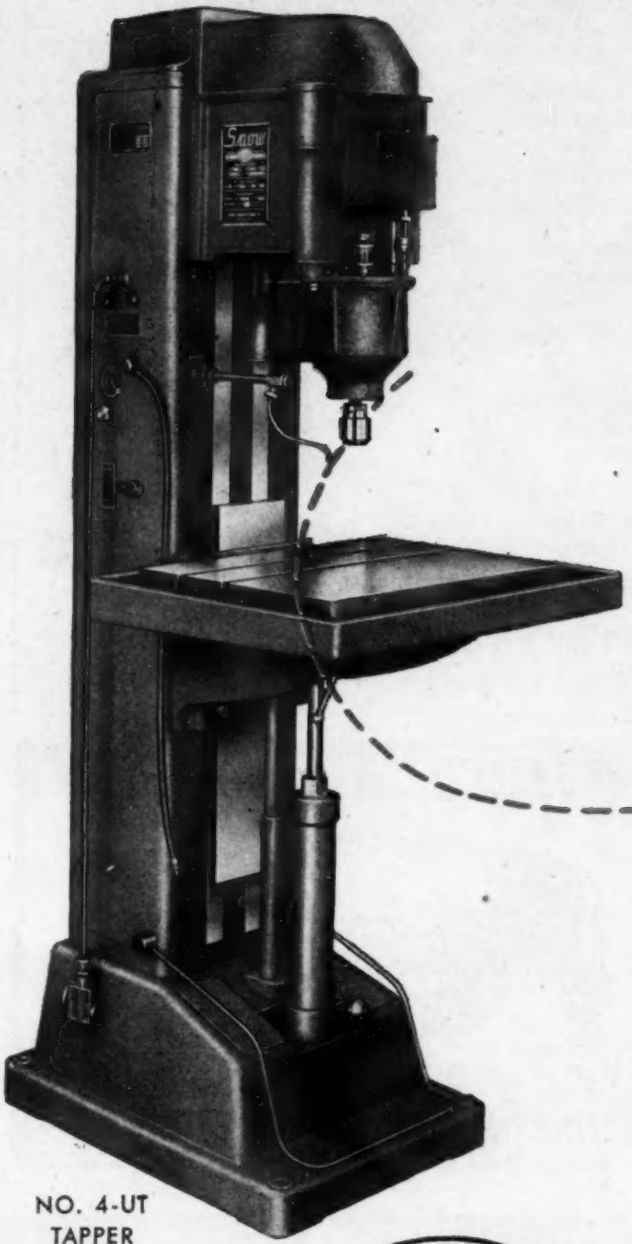
FUNCTIONS *three* WAYS



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the *basic* SNOW AIR TOOL

Time-tested, quality-proven, thousands have been put into use in the past sixteen years. The Snow Air Tool — fundamental tool around which are built—the Snow Tapping Machine, the Snow Drilling Machine, the Snow Threading Machine.

Air operated—electrically controlled, it includes the latest in design. Quick-acting automatic holding fixtures are made fully automatic, semi-automatic or manually operated—all by the turn of a switch.

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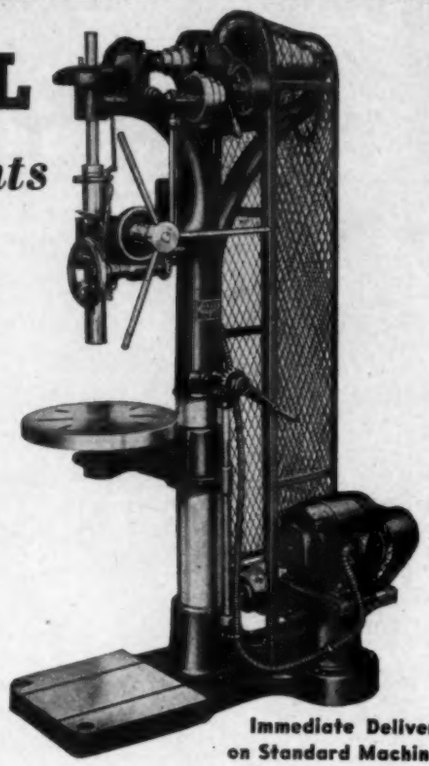
A NEW 20" DRILL

To Meet Your Requirements



FOR ACCURACY Ruggedly designed for modern production. All parts tooled for interchangeability—Spindle is forged steel and quill has bronze oil-groove bushings—Morse taper as well as table arm is bored in spindle after assembly—table surface held at right angle to spindle to .007 in 6 inches.

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FOR CAPACITY Power is delivered smoothly to give the Sibley 20" a capacity of 1¼" in cast iron or equivalent in other metals. Drive gears of 1:2 and large back gears of 1:4 ratios deliver ample power for every load—Castings are high-tensile, semi-steel. Motor drive is cast integral with the machine base.

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for rigid inspection of a wide range of parts . . .

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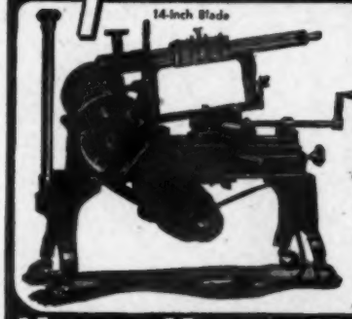

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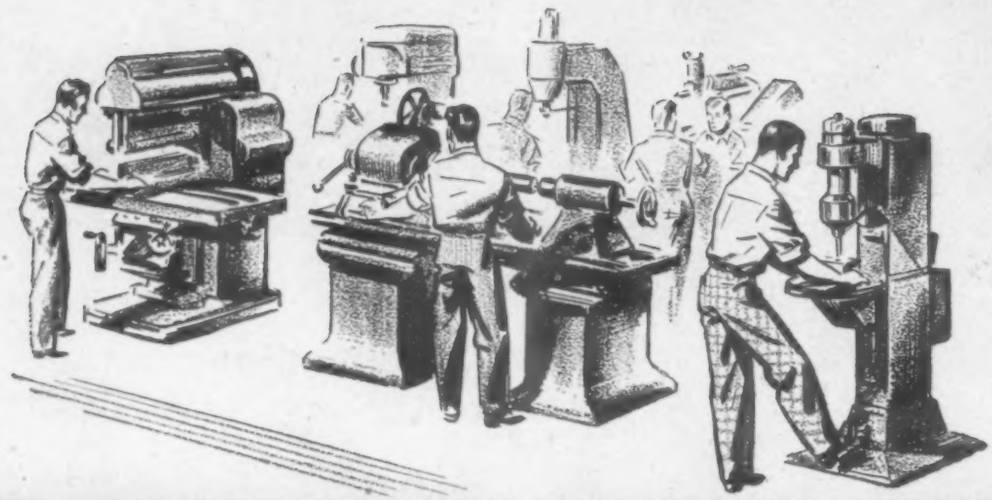

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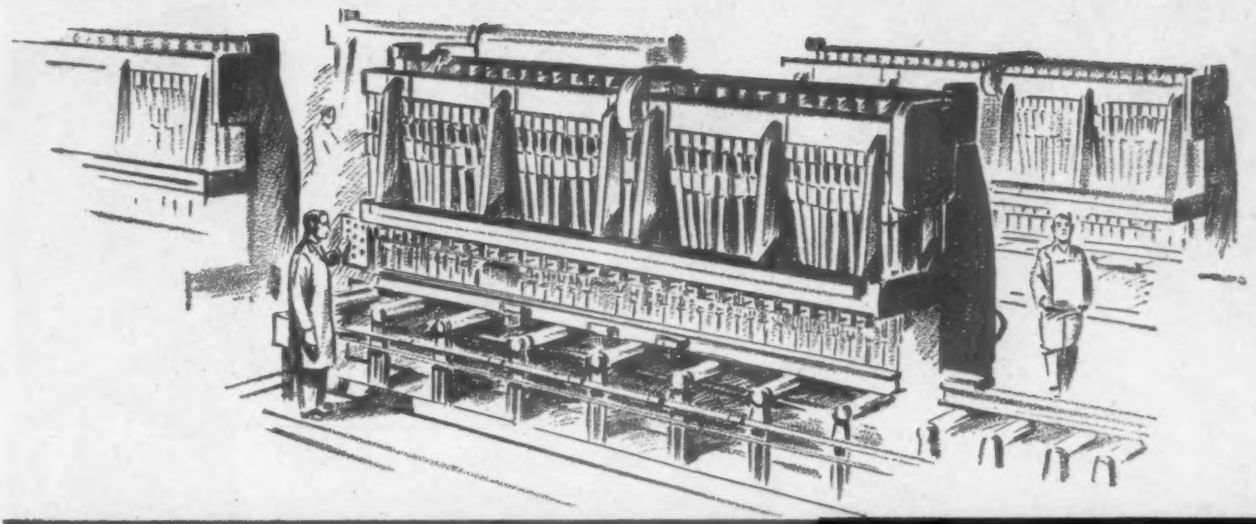

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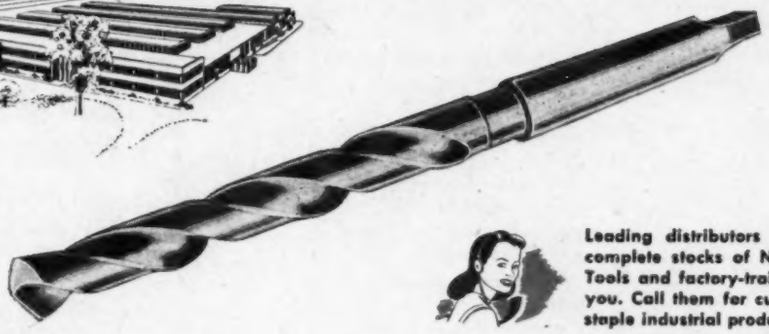

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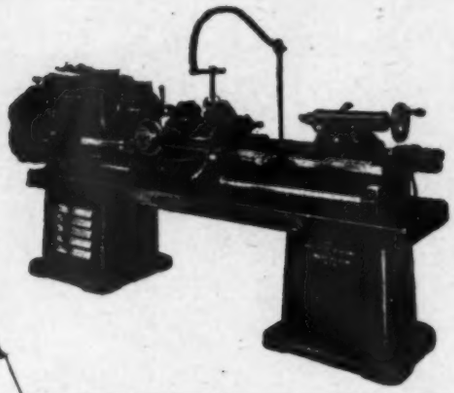

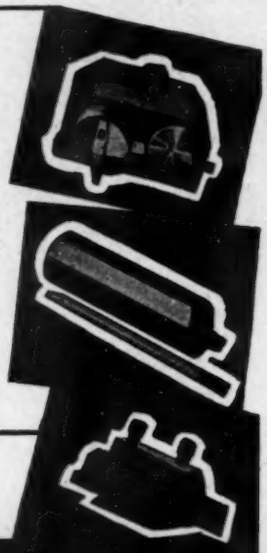

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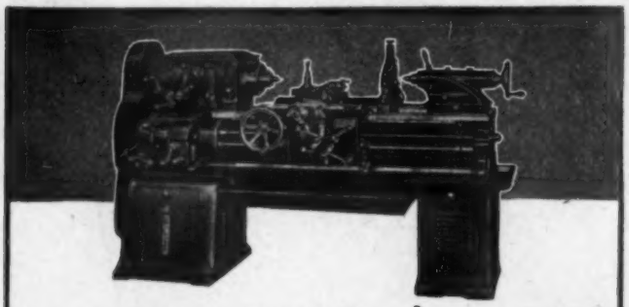

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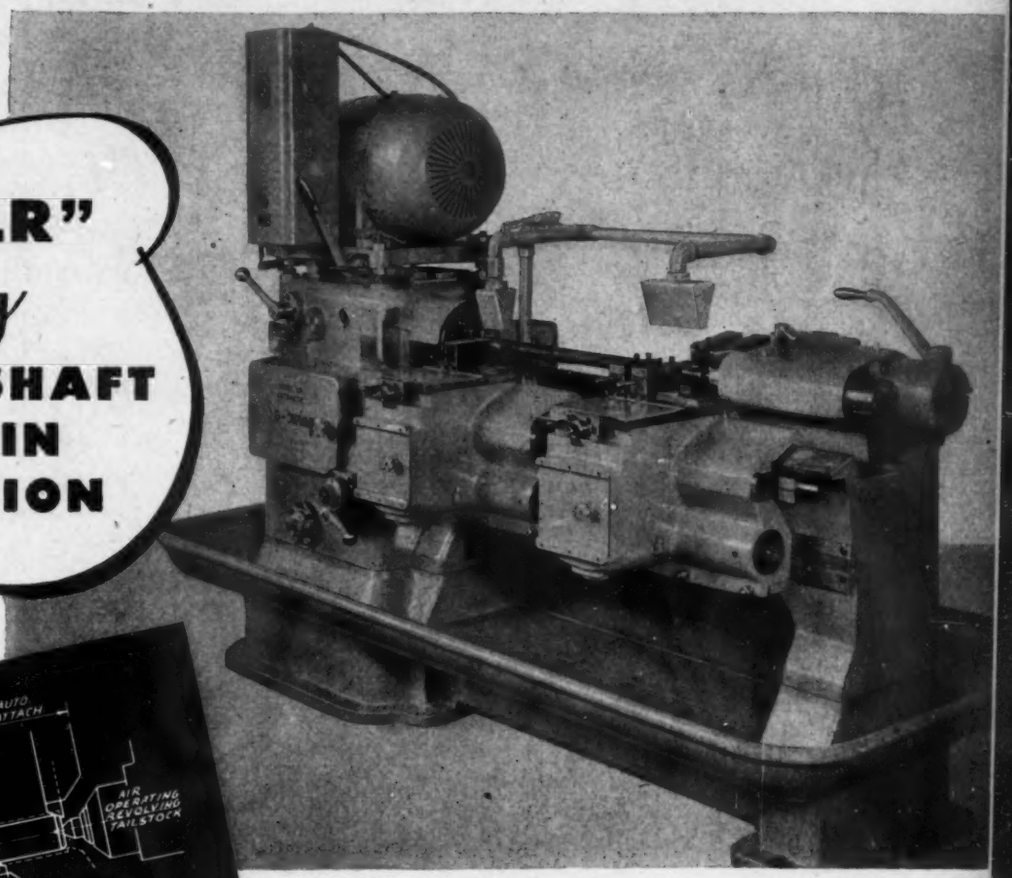
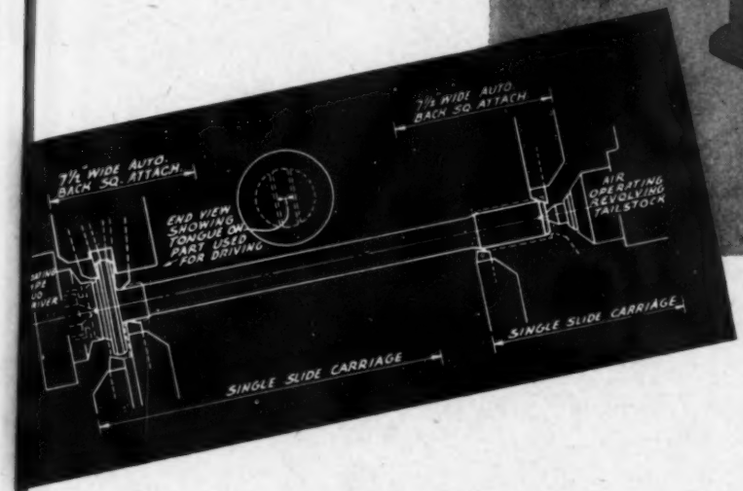
MACHINE OF THE MONTH

EPARED BY THE SENECA FALLS MACHINE CO. **"THE Lo-swing PEOPLE"** SENECA FALLS, NEW YORK

MODEL "LR" Lo-swing TURNS AXLE SHAFT COMPLETE IN ONE OPERATION




7/8" WIDE AUTO. BACK SQ. ATTACH.
7/8 WIDE AUTO. BACK SQ. ATTACH
END VIEW SHOWING TONGUE ON PART USED FOR DRIVING
AIR OPERATING REVOLVING TAILSTOCK
SINGLE SLIDE CARRIAGE
SINGLE SLIDE CARRIAGE

Problem: To provide a standard Automatic Lathe for turning both ends of automotive axles in one operation, using cemented carbide tools and fast cutting speeds.

Solution: The Model "LR" Lo-swing Lathe selected for this job was equipped with two independently operated front carriages and two rear facing attachments. All tool slides operate simultaneously, as shown in the line drawing, making for fast machine cycle.

The forging dies used for forming the flanged end of the shaft were first modified to obtain a driving tongue (shown on layout) which, used in conjunction with a special driver, will clear the tooling used for finish turning the different surfaces on the large flange.

The Model "LR" Lo-swing carriages are equipped with the Seneca Falls Quick Change-over mechanism. Change-over from one type of axle shaft to another is easily and quickly accomplished by setting two calibrated dials to the proper position, thus eliminating entirely the necessity for designing any special cams or tooling.

Our engineers are at your disposal for assistance with any of your turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

LATHE NEWS from SENECA FALLS

BARNES BAND SAWS

...for greater efficiency IN metal sawing!

The Barnes Line of Metal Cutting Band Saws Includes:

- **HARD EDGE FLEXIBLE BACK**
- **ARC-LINE** (Narrow width for Contours)
- **SKIP TOOTH**
- **SPRING TEMPER**

TRY Barnes Band Saws and prove the above statement to your own satisfaction. Barnes Band Saws have:

(1) Correct tooth form for ease in cutting;

(2) Uniform set to give straight, smooth, accurate cuts;

(3) Proper hardness and temper for long blade life;

(4) Utmost care in welding necessary to provide strong, endless saws.

YOUR Industrial Distributor or a Barnes Service Engineer will gladly recommend the blade *designed* and *made* for your particular band saw operation . . . the Barnes blade that will provide you longer, more efficient cutting service.

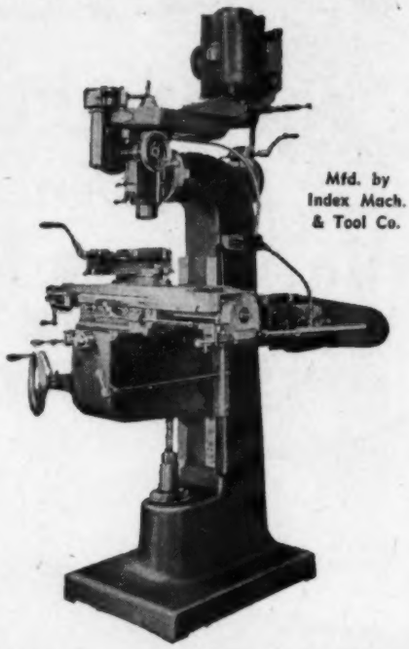
ESTABLISHED 1919

W. O. BARNES CO., INC.

DETROIT 14, MICHIGAN

INDEX MILLS

will help you on your tool, die and production work. In addition to micrometer dials on screws, verniers are standard equipment for cross and longitudinal locating. If finer precision is desired, rods and indicators are available. These in conjunction with power feed to a precision ball bearing spindle make a very versatile machine for milling, drilling and boring. *Literature promptly mailed on request.*



Mfd. by Index Mach. & Tool Co.

12" Tool Room Rotary Table

A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

For use on Index Mills or any other machine that will accommodate a 12" table.

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JACKSON, MICH.

SCRAP YOUR *Obsolete* EQUIPMENT

THE replacement rate of special-purpose tools, along with plant lay-out streamlining, is being stepped up today by most manufacturers, to reduce production costs.

One example is the grinding of steel propeller shaft slip yokes on TWO sides at ONE set-up, as shown here. A Gardner No. 125-26" Double Spindle Grinder with an air-draulically operated knee, is used to accomplish this mass-production efficiency.

Give a Thought To GARDNER-GRINDING In Your *Modernization* Plans!

PRODUCTION: 3 to 4 pieces per minute.

STOCK REMOVAL: .010" to .015" overall.

FEEDING: Hand load and unload to special fixture mounted upon an air-draulically operated table.

Compensate for increased labor costs and the growing need for reduced prices, by GARDNER-GRINDING parallel surfaces of parts used in *your* products.

Write for Data on GARDNER Double GRINDING!

GARDNER-GRIND YOUR *Flat* SURFACES

GARDNER MACHINE COMPANY

410 East Gardner Street , , , , Beloit, Wisconsin, U.S.A.

Goss & De Leeuw

THE WORLD'S FINEST MULTIPLE SPINDLE

Chucking Machines

GOSS & DE LEEUW MACHINE CO.

New Britain, Conn.

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tops in the tool room

Save three ways with Grand Rapids No. 10-B Combination Tap and Drill Grinder:
1. Lower first cost; 2. Less maintenance expense;
3. Valuable floor space.

Write for Bulletin G.L. 8-46

Grand Rapids 10-B Combination Tap and Drill Grinder

GALLMEYER & LIVINGSTON COMPANY
Manufacturers of Grand Rapids Grinders
330 STRAIGHT ST., S. W., GRAND RAPIDS 4, MICH.

If you want
MORE PARTS *per hour*
LOWER COST *per part*

the BARKER WRENCHLESS CHUCK can do it faster, better and stand up to it longer. Where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine, these Chucks will increase production and pay for themselves in 60 to 90 days while doing it. See how a Barker Wrenchless Two-Jaw or Three-Jaw Chuck can speed up production in YOUR plant.

Write for bulletin 201 today

Chuck Division
THOMAS HOIST CO.
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NOTICE

TO USERS OF SURFACE GRINDERS

You do better work and more of it per machine per day when your 6″ x 18″ Surface Grinders are equipped with this

POPE COMPLETELY SEALED MOTORIZED SPINDLE

Here is a *smooth, streamlined, self-contained package unit* with G-E motor *sealed in* and with *sealed lubrication* for its extra big SKF Super-Precision Double Row roller bearings. Dust and dirt can't get at it. It runs cool, needs no attention, delivers a full 1 HP at the wheel.

Put this Pope Precision Spindle to work on your grinders and see for yourself how fast it roughs off surplus metal and what superior finishes it produces.

Let us mail you Data Sheet No. 12.

No. 41

POPE

POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

BUILDERS OF PRECISION SPINDLES

THEY'RE NEW!

L-W *Medium Duty* 4-JAW INDEPENDENT CHUCKS FOR SMALL LATHES

The bodies are semi-steel castings. Ground surface on face and outer edge. Steel jaws. Hardened and ground steps. Heat-treated steel screws.

RUGGED 8" MEDIUM DUTY

complete with wrench **$21.00**

6" HEAVY DUTY

complete with wrench **$16.95**

Also available for both sizes are completely finished, ready to mount adapter back plates with 1½"—8 thread suitable for some models of Atlas, Clausing, South Bend and Logan lathes, and rough adapter back plate castings which can be machined to requirements.

Finished adapter plate 1½"—8 thread for 8" Medium Duty Chuck	$3.60
Finished adapter plate 1½"—8 thread for 6" Heavy Duty Chuck	$3.00
Rough adapter plate for 8" Medium Duty Chuck	$1.50
Rough adapter plate for 6" Heavy Duty Chuck	$1.25

4-JAW *HEAVY DUTY* INDEPENDENT LATHE CHUCKS

Sturdy, accurate. Hardened steel reversible jaws. Semi-steel body. Wide gripping surface, oversize, tough nickel steel screws, steel thrust bearings assure durability.

10"	$39.35	14"	$50.40
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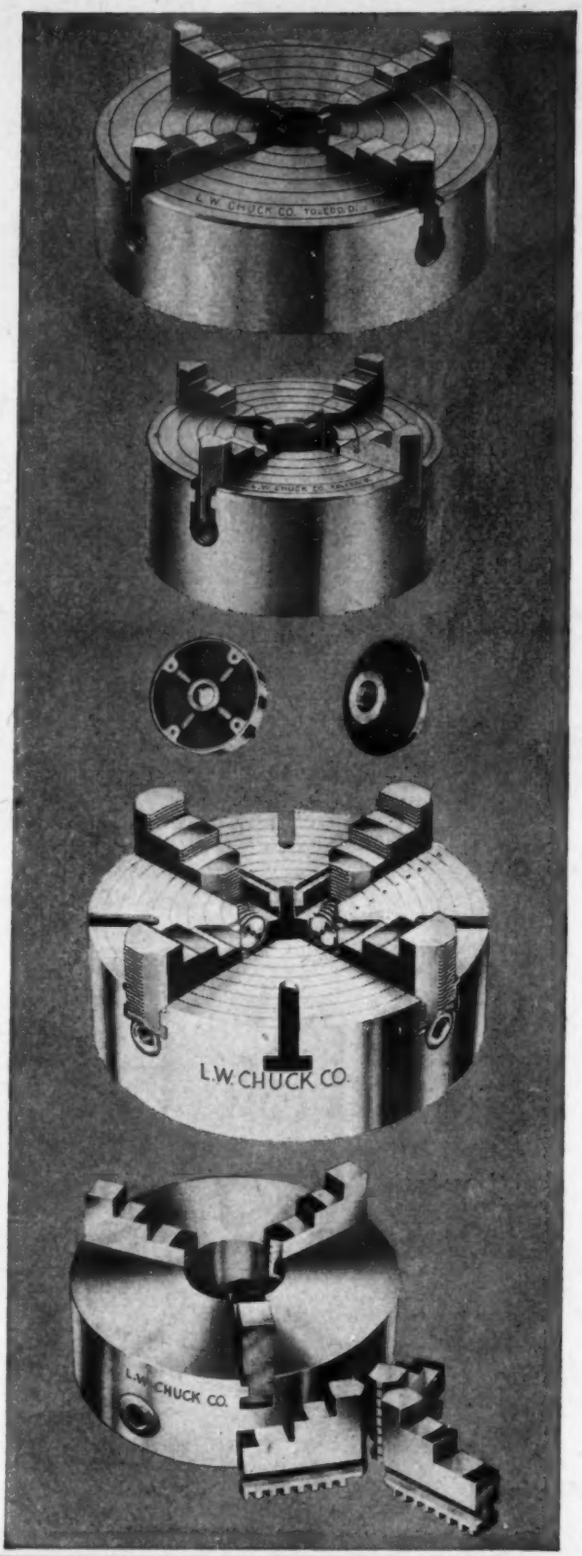
18"	$87.75		

3-JAW UNIVERSAL LATHE AND SCREW MACHINE CHUCK

For light or heavy duty work. Guaranteed to run true. Hardened steel reversible jaws. Semi-steel body. High grade alloy geared scroll and steel pinions.

6¼"	$45.00	7½"	$55.00	10½"	$83.35



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made by welders...for welders

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Bridgeport—Oxy-Acetylene Welding Co.
Hartford—W. C. Getchell Co.

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Six models, including 3 new models of 150-, 200-, and 250-ampere capacity. Heavy-duty models: 300-, 400-, 500-ampere capacity. Write for specifications and prices.

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CHIP, CUT, DRILL, GOUGE

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Thor U-100 Hammer with the "Sling Shot Drive"

Thor offers a full selection of hammer tools for working with wood, brick, stone, metal composition and other materials.

1600 power-packed blows per minute with Thor Hammers save time and money on hundreds of construction, maintenance and repair jobs. Use them in working stone, concrete, wood, metal and other materials—drilling, channeling, cutting, gouging, chipping, scaling, etc. *Thor's famous "Sling Shot Drive" puts more wallop into every blow.* YOU PROFIT BY LOWER JOB COSTS. Let a demonstration show how. *Your nearby Thor distributor will gladly arrange one at your convenience.*

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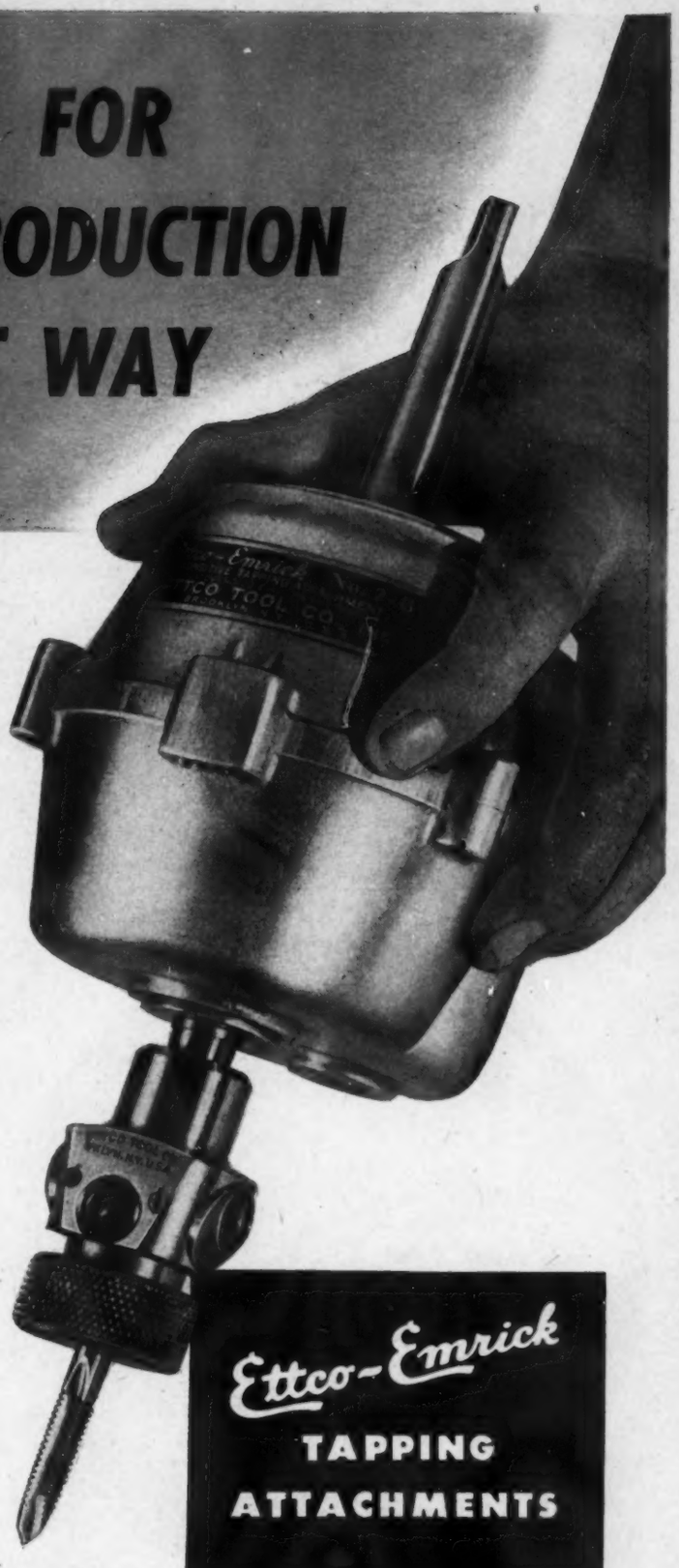
... Thor **PORTABLE POWER TOOLS**

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

TOOL UP FOR TOP TAPPING PRODUCTION THIS LOW-COST WAY



Just slip one of these relatively inexpensive Ettco-Emrick tappers into the spindle of your drill press, and as easily as that—you can tool up to get all the extra tapping capacity you need at minimum tooling cost. These high-speed, sensitive tappers will handle any production tapping job within their capacity fast and accurately. And they'll keep tapping production flowing along smoothly. Exclusive design and construction features make them easy to use and provide full protection against tap breakage and work spoilage.

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MADE IN 7 SIZES
FOR No. O to 1" TAPS

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TAPPING ATTACHMENTS

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Over 25 years specialization in solving industry's drilling and tapping problems

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meet every demand for precision truing of grinding wheels

Whether for machine or hand truing . . . whether for use in grinding taps, threads, broaches, gages, contour forms . . . in fact for every service where grinding wheels are trued, there is a Gilmore Diamond Tool specially developed for the purpose. Thus by coming to Gilmore for solution of your wheel truing problems you can be assured of a complete, specialized service and take advantage of our long experience as pioneers in the development of modern methods for precision truing of grinding wheels.

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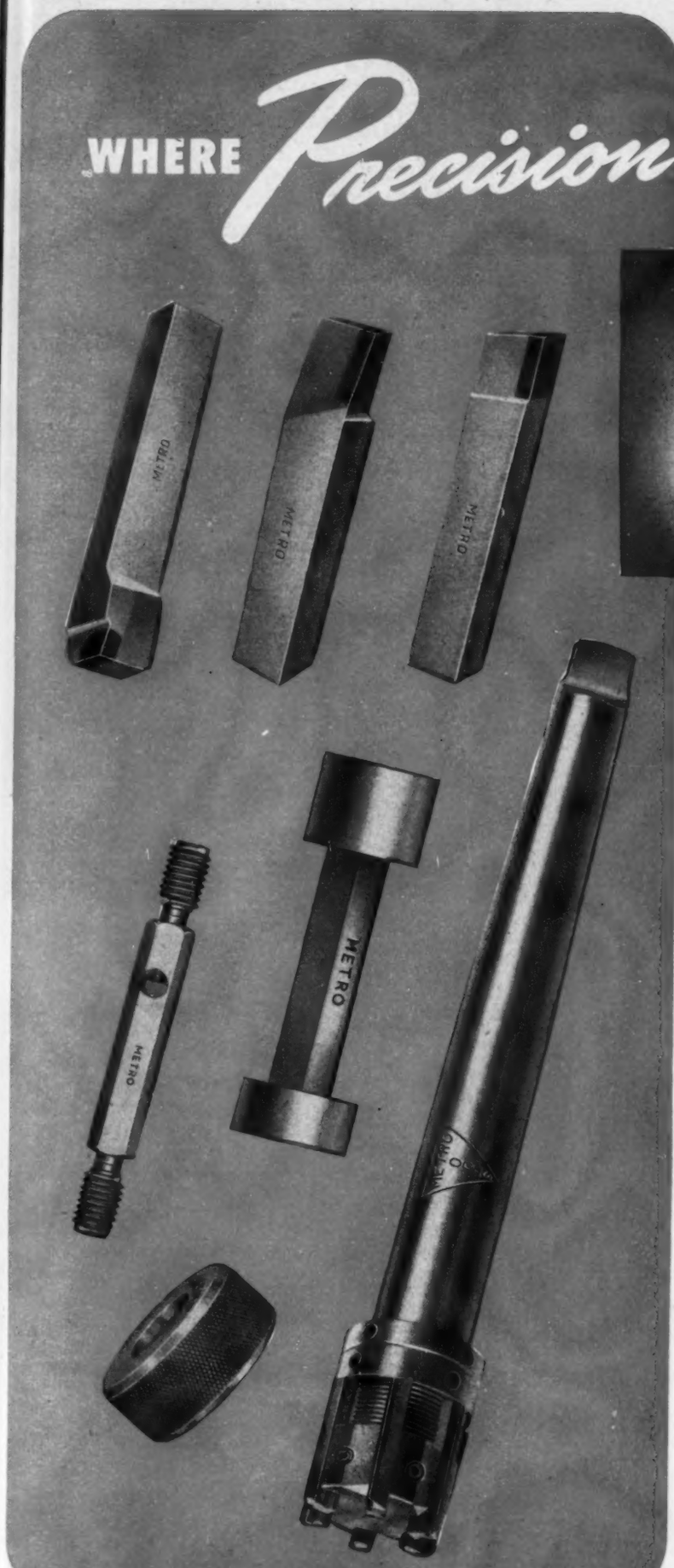

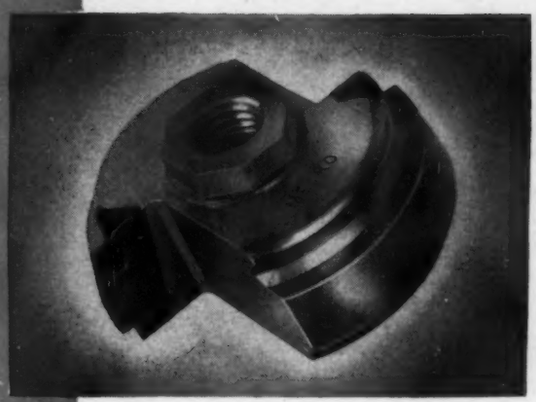

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METRO

TOOL AND GAGE COMPANY

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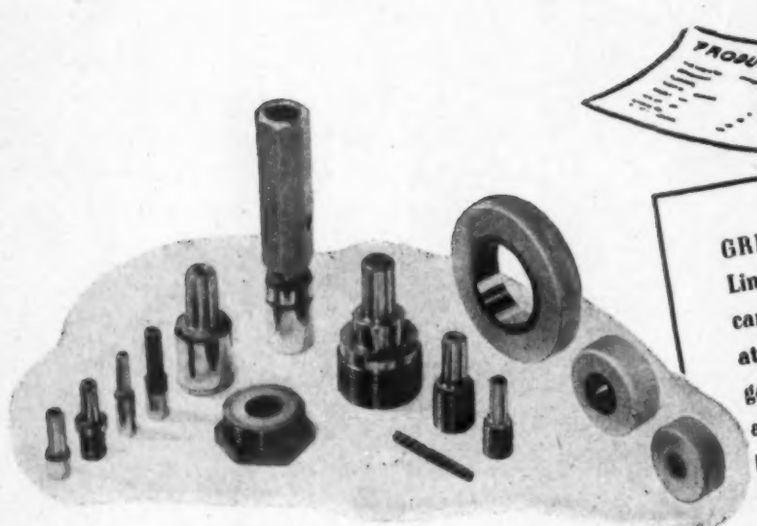

GREATER INSPECTION ECONOMIES? Lincoln Park gages made of cemented-carbide for high volume inspection provide at least 50 times the service life of steel gages . . . those made of chrome plate for average volume inspection have a service life at least 5 times greater than when steel is used. Lincoln Park has always offered the experience and facilities to produce good wear-resistant gages.

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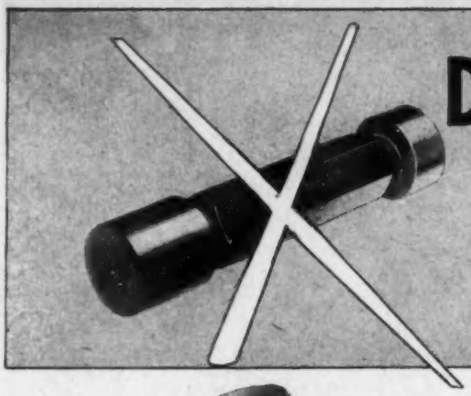


DuBo Gages are going over!

Orders and re-orders demonstrate DuBo superiority over cylindrical plug gages

STANDARD

DuBo* Plug Gage

checks bores FASTER, more accurately!

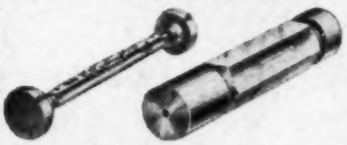
SINGLE END
Sizes 1.510" to 6.010"
(38 mm. to 152 mm.)

DOUBLE END
Sizes .240" to 1.510"
(6 mm. to 38 mm.)

Enthusiastic users all over the country are rapidly replacing cylindrical plug gages with DuBo Gages. The first use unmistakably demonstrates DuBo superiority — its extreme lightness, its ability to detect dimensional deviations (taper and out-of-roundness), its ease, speed and accuracy. STANDARD representatives in leading industrial centers will gladly arrange a demonstration for YOU.

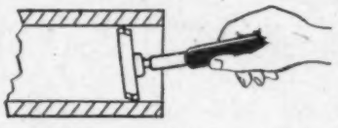
WRITE FOR BULLETIN *Patents Pending

LIGHT IN WEIGHT



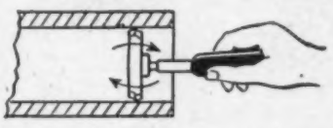
DuBo Gages weigh 70% to 80% less than cylindrical plug gages of equivalent size. Lighter weight means less fatigue, greater accuracy.

EASY TO ENTER



DuBo is entered easily by tipping handle slightly above bore axis (no jockeying necessary). Enters even under-sized bores easily.

DEFINITE CHECK



Enter gage, rock handle gently, bringing spherical gaging surface in contact with bore wall. Whether or not handle drops freely below center is definite yes-or-no answer.

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

YOUR PLANT CAN BENEFIT

by OAKITE
REG. U.S. PAT. OFF.

TECHNICAL SERVICE

in 3 important ways!

1 By taking advantage of the individual, personal services of the carefully trained metal-cleaning specialists comprising the nation-wide Oakite Field Staff. One of these men is located near your plant.

2 Profiting by their years of successful and diversified experience in metal cleaning and the surface preparation of ferrous and non-ferrous metals.

3 Benefiting (1) by their practical knowledge of metal production processes and (2) by their understanding of the chemistry of cleaning and related materials.

Cost-Cutting Materials and Methods Based on Nearly 40 Years Experience

There is no satisfactory substitute for **EXPERIENCE** either in the field of metal fabrication and production or in the complex, highly specialized field of metal cleaning and surface preparation. Back of Oakite materials and methods are nearly 40 years of chemical research and successful experience. Thousands of metal working plants today are benefiting by this Oakite "know-how"... performing some metal cleaning or production operation at LOWER COST, easier and with improved results. We would like to serve you in the same helpful way.

Oakite Technical Service is Nation-Wide

Wherever your plant, there is a nearby Oakite Technical Service Representative "on call", ready to work with you and give you the full benefit of his diversified metal cleaning experience. Since this service is free... won't you ask to have him call? You have everything to gain... nothing to lose.

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Technical Representatives in Principal Cities of U.S. & Canada

Free Manuals give answers to many metal production problems

OAKITE SOLUBLE OIL
for cooling and lubricating in cutting, grinding and machining operations.

OAKITE SPECIAL PROTECTIVE OIL
for rust-proofing parts between production procedures; protecting tools from "indoor" rust.

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for use in wire drawing operations to prevent rusting; to prolong die life; to shorten baking time.

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for cleaning and conditioning metal surfaces before applying organic, chemical or plated finishes.

Your letterhead request for any of these Manuals will be given prompt attention.

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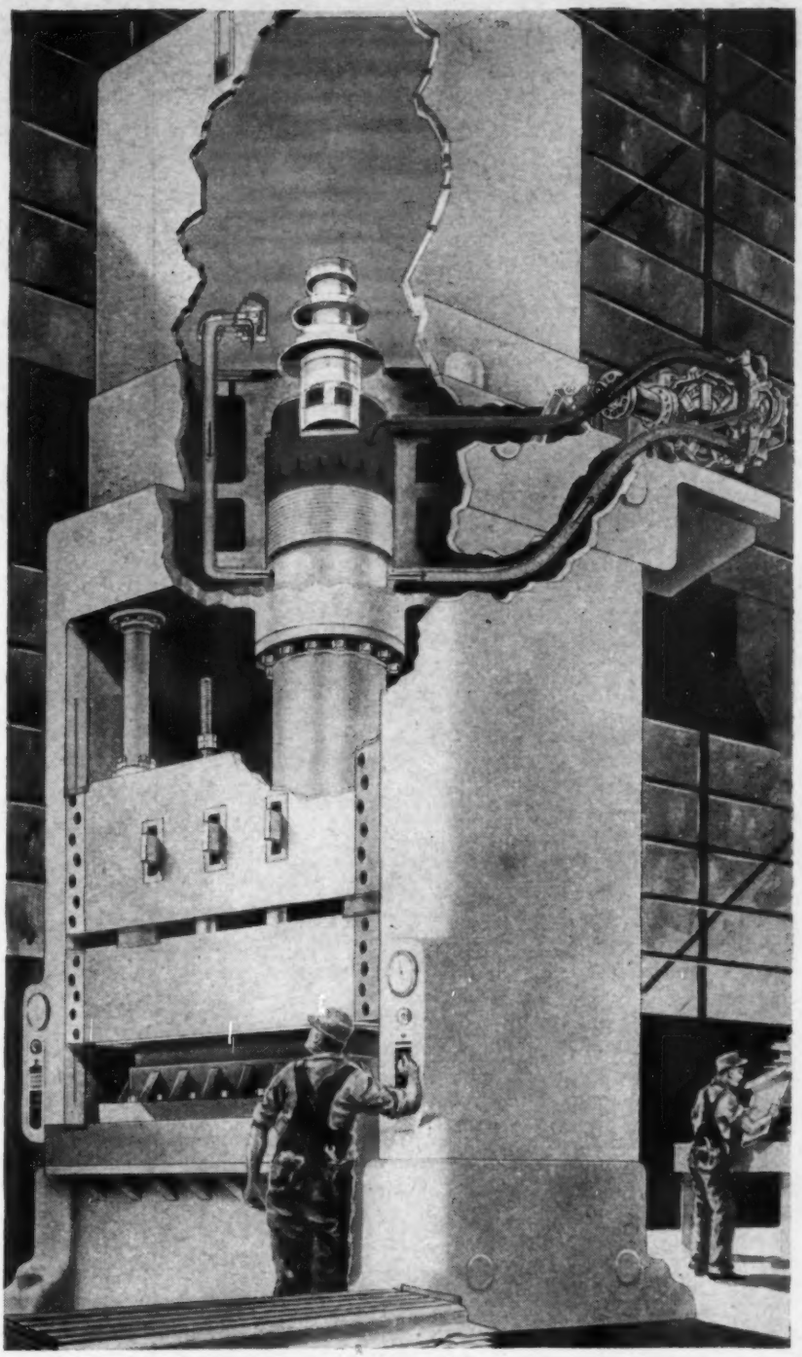
Specialized Industrial Cleaning

Inside Knowledge on Lubrication Problems

— PRESSURE —

This is One of a Series of Messages on Common Problems in Your Plant

Oil Strategy FOR A "Big Push!"



OIL IS UNDER PRESSURE in two ways in this big hydraulic press. As the power behind the ram, it must transmit pressures that produce forces up to several hundreds of tons. As a lubricant, it must fight these same pressures and protect moving parts against friction and wear.

With heavy stresses like this on both oil and machine, it's sound strategy to look for an oil with an outstanding record of performance in hydraulic operation. You'll find it in Gargoyle D.T.E. Oils.

These famous oils possess high chemical stability that enables them to be circulated without deterioration for long periods. They resist the formation of deposits that may clog valves and interfere with controls. They separate readily from water. Even under very high pressures they maintain strong films that resist rupture, prevent metal-to-metal contact and minimize wear. Their high lubricity assures smooth press action.

Ask your Socony-Vacuum Representative for correct recommendations for your presses.

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ARE YOUR WORKERS WASHING WITH *FIRE?*

Of all the precious assets your plant possesses, none is more important than the hands of your workers!

And dangerous undesirables in any worker's washroom are "fiery" hand cleaners whose strong alkaline or harshly abrasive action tends to irritate or injure the skin's surface, making it more susceptible to infection.

West Sulpho Hand Cleaner—a liquid skin cleanser made of sulphonated vegetable oil—is one of your best safeguards against this condition.

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An aid in cutting down costly absenteeism, Sulpho is designed to *get out* soil, grease and grime *without harming or defatting sensitive dry skin.*

Sulpho is one of hundreds of products developed by West for the promotion of effective sanitation. Consult with one of a nationwide staff of over 350 experienced West representatives.

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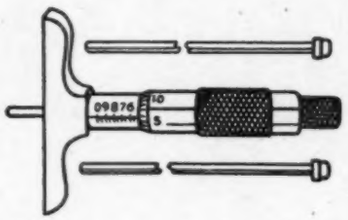
MICROMETER DEPTH GAGES



Designed for measuring holes, grooves, shoulders, etc., up to 3 inches in depth. Includes a set of interchangeable rods —1-inch, 2-inch and 3-inch, which are easily inserted and held to a positive seat by the knurled rod cap. There is an adjusting nut on each rod to compensate for wear.

The case hardened steel base is furnished in either 2½" or 4" lengths. Ends of measuring rods are hardened, precision ground and lapped. Furnished with or without case. Ask your jobber.

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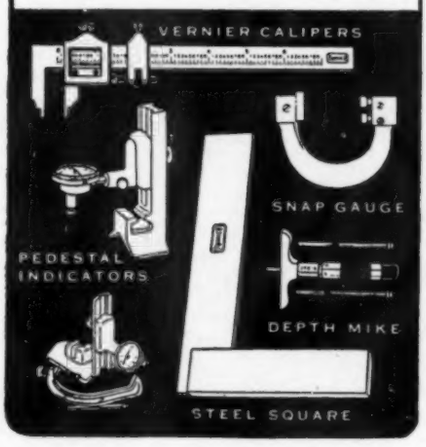
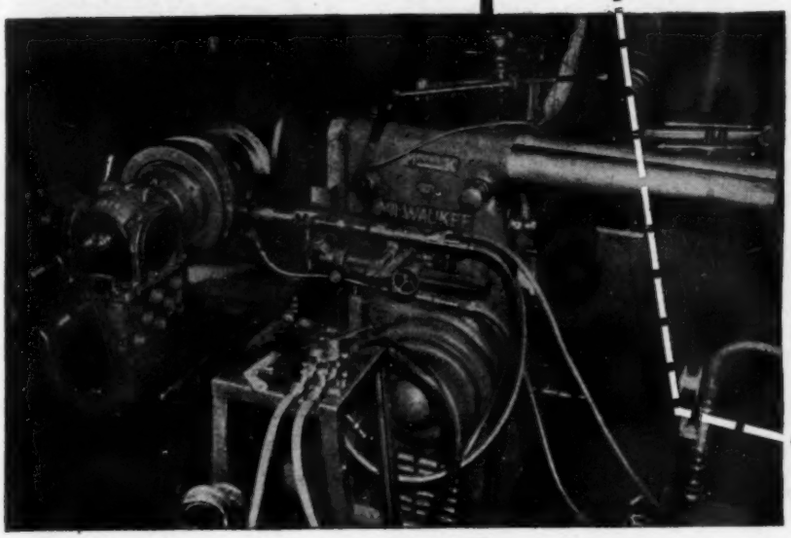


how to lengthen the life of machine tool parts

by Airco Flame Hardening



PART: Cam Track in Barrel Cam
MATERIAL: Meehanite
HARDNESS OBTAINED: 62 Rockwell "C" 86 Scl.
DEPTH OF CASE: 1/8 inch
SET-UP (Change-over) TIME: 3 hours
CYCLE TIME: 20 minutes
DISTORTION: None measurable
Performed on Kearney & Trecker 2K Universal Horizontal Milling Machine with cam-milling saddle. Standard Airco tapered cylindrical tip, flame-hardening torch, universal adjustable bracket, and accessories used.

Milling machine converted to flame hardener in 3 hours, barrel cam hardened in 20 minutes

HOW IT WAS DONE — After cam was milled, holder and torch were clamped to column face of milling machine. Both sides of cam track were flame hardened in one revolution with the identical set-up used in machining the cam. Since contours followed in hardening were identical to those in milling, uniform hardness and depth of case were achieved.

Because of mass of the barrel cam, certain extra precautions were used. The coolant was circulated through a refrigerating unit mounted at rear of machine. An auxiliary quench was used. Baffle plates deflected heat from machine and dividing-head surfaces. No measurable distortion occurred. No damage resulted to milling machine or attachments used.

This is typical of the type of equipment that can be flame hardened to extend service life. Flame treatment does not effect properties of the core — wear-resisting surfaces are produced while still retaining the toughness and ductility of core material. Distortion is so negligible that hardening is normally done after finish grinding.

Airco flame treating can be economically applied to single parts or to units in mass production. Normally standard machine tools, with standard Airco oxyacetylene equipment, are all that is needed.

If you are making or using parts that will give longer life when surface hardened, fill in and mail the coupon for copies of Oxyacetylene Flame Hardening Handbook and Flame Hardening Apparatus Catalog No. 90. Air Reduction, General Offices, 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, General Offices: Houston 1, Texas. Represented internationally by Airco Export Corporation.

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Originators of Modern Oxyacetylene and Electric Arc Methods for the Metal Working Industry

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Another development of
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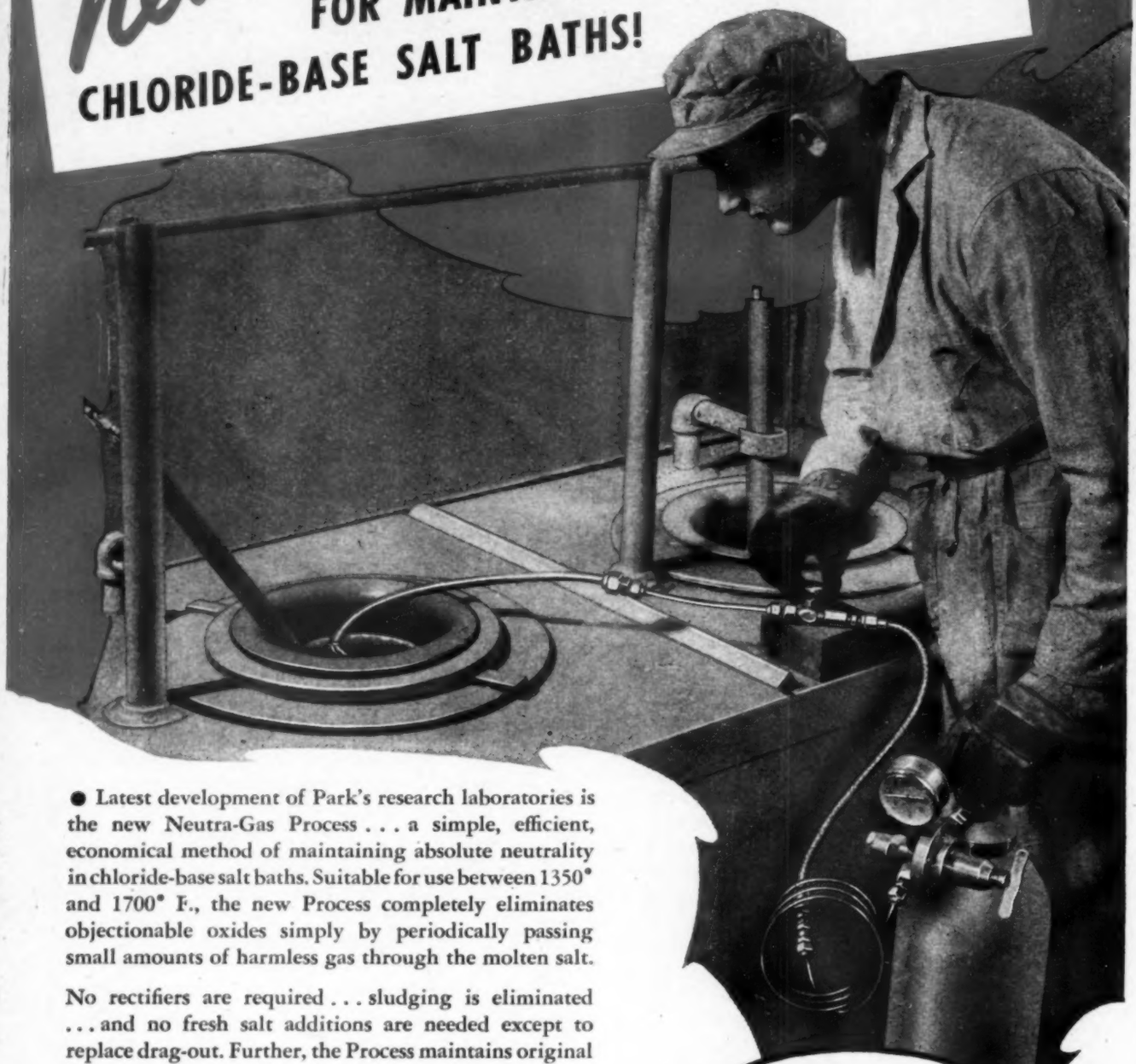
New NEUTRA-GAS PROCESS* FOR MAINTAINING NEUTRALITY OF CHLORIDE-BASE SALT BATHS!



● Latest development of Park's research laboratories is the new Neutra-Gas Process . . . a simple, efficient, economical method of maintaining absolute neutrality in chloride-base salt baths. Suitable for use between 1350° and 1700° F., the new Process completely eliminates objectionable oxides simply by periodically passing small amounts of harmless gas through the molten salt.

No rectifiers are required . . . sludging is eliminated . . . and no fresh salt additions are needed except to replace drag-out. Further, the Process maintains original fluidity of the bath and work leaves as clean as when it entered. Write today for our Technical Bulletin No. H-25. It tells the whole story.

*Patent pending

● Liquid and Solid Carburizers ● Cyanide, Neutral, and High Speed Steel Salts ● Coke ● Lead Pot Carbon ● Charcoal ● No Carb ● Carbon Preventer ● Quenching and Tempering Oils ● Drawing Salts ● Metal Cleaners ● Kold-Grip Polishing Wheel Cement

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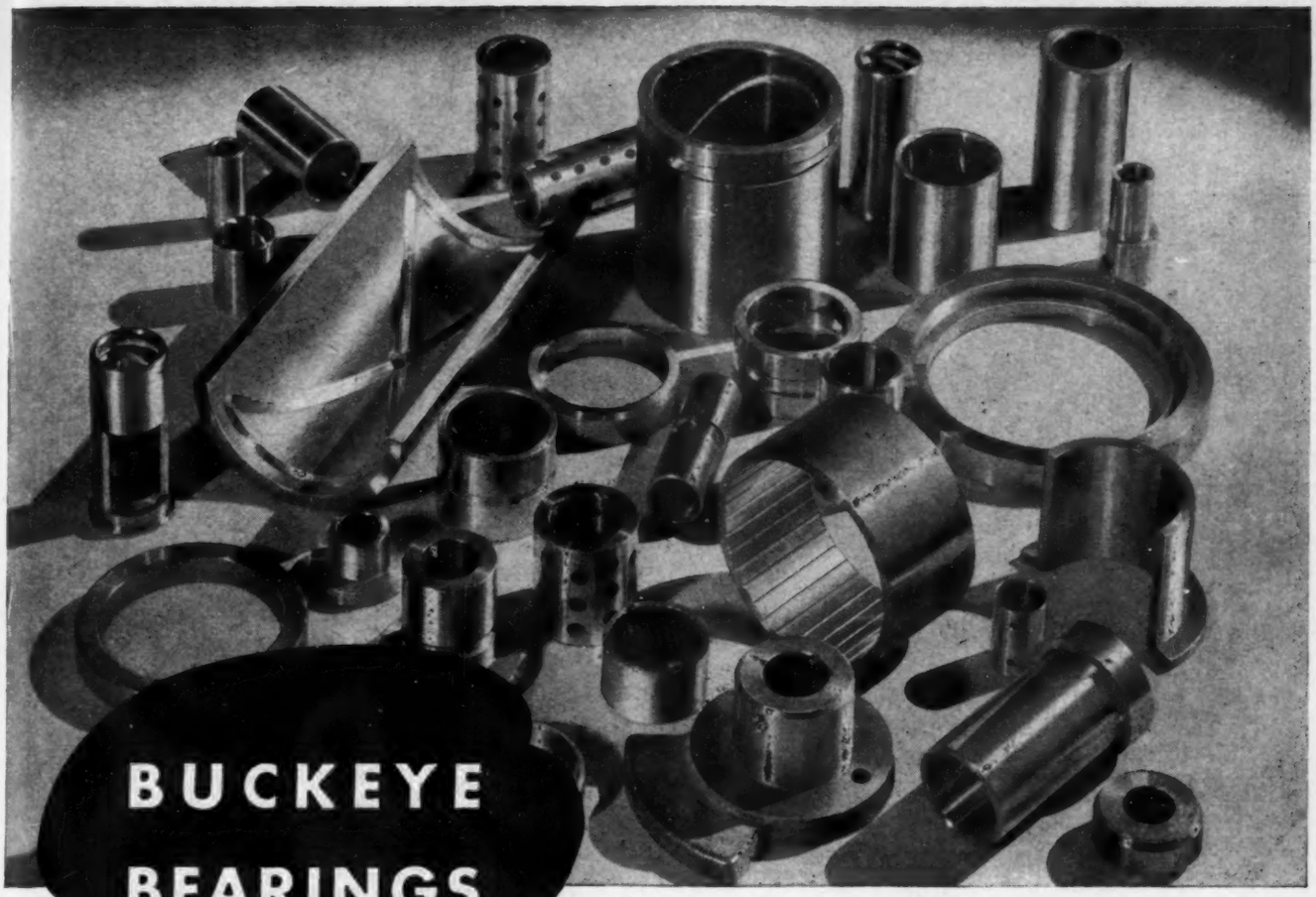

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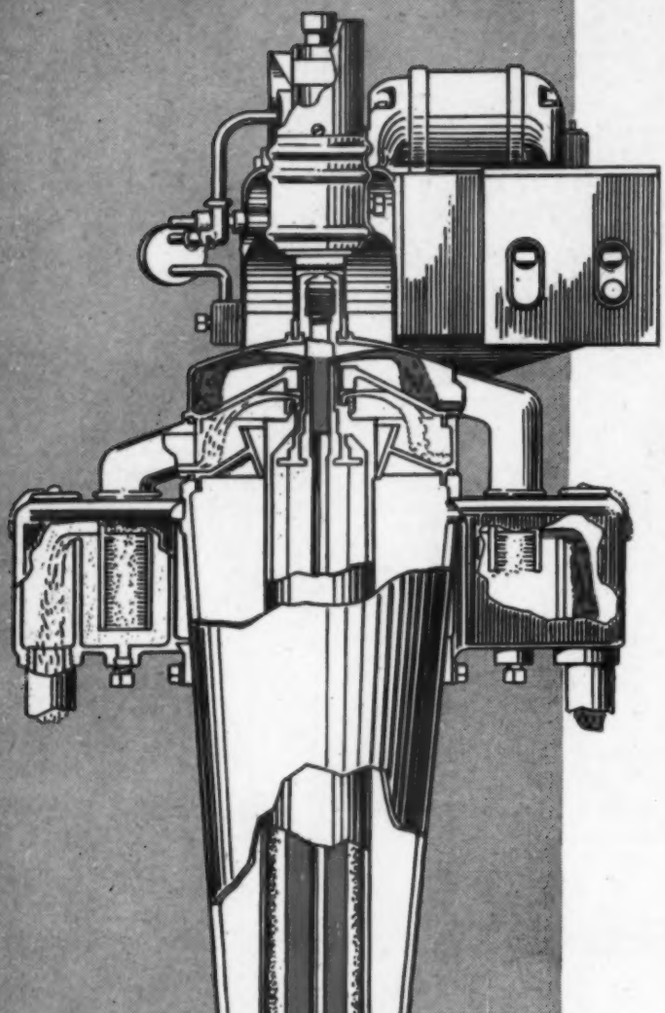

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..and how it flows is vitally important

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It *has* to be, because these readers are the production executives who make decisions in plants representing 90% of metalworking production. Their decisions on lubricants and how they are used, if made soundly and sensibly, reduce costs and increase quality and efficiency in the manufacture of every metalworking product. So do their decisions in respect to the thousands of other things they must use in making products representing over one third of all industrial production. *American Machinist's* job is to bring to these fact-wanting readers as much helpful, dependable information as it can on how—and with what—they can get their jobs done better. And if you sell any one of the almost unlimited products, materials, or services they want and seek, the advertising pages of *American Machinist* are your most impelling and influential place to tell them about it.

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This advertisement, now appearing in the advertising press, we think is of interest to you as well as to the advertising executives to whom it is primarily addressed. As this advertisement points out, American Machinist is a quality advertising medium because its editorial quality draws readership by metalworking executives like you. Herein are some of the facts on how, and why, our editors use color in the articles they bring you every other week.

THAT TEACHES

. . . and teaching, informing, and helping metalworking production executives is American Machinist's editorial job.

WE appreciate that color is attractive in itself, has attention value, and makes pages pleasanter reading. That's why *American Machinist* covers are all sparkling, four-color kodachromes, and why we use color in our editorial pages to bind articles together, keep readers' eyes moving along, and to invite attention to particularly important editorial sections.

But much more importantly, we think that color can, and should, serve a strictly functional purpose in our editorial pages. The men who read these pages are busy men, who read *American Machinist* to find out as quickly and clearly as possible the wealth of facts on new products and methods which can help them to do their jobs better. Color can often help—show at a glance how machines do work, or how fluids and electricity flow. And whenever color can help, *American Machinist* editors use it, just as they use every other alert editorial tool to make this magazine a balanced, forceful, hard-working aid to busy and influential men.

Editorial excellence is the reason why 27,000 of Metalworking's top production executives pay to read *American Machinist* twice every month. It is the reason why advertisers, who want to tell their product story under the most favorable readership circumstances, invest more of their advertising dollars in *American Machinist* than in any other metalworking magazine. And it is also the reason why good advertising in *American Machinist* begets outstanding results.

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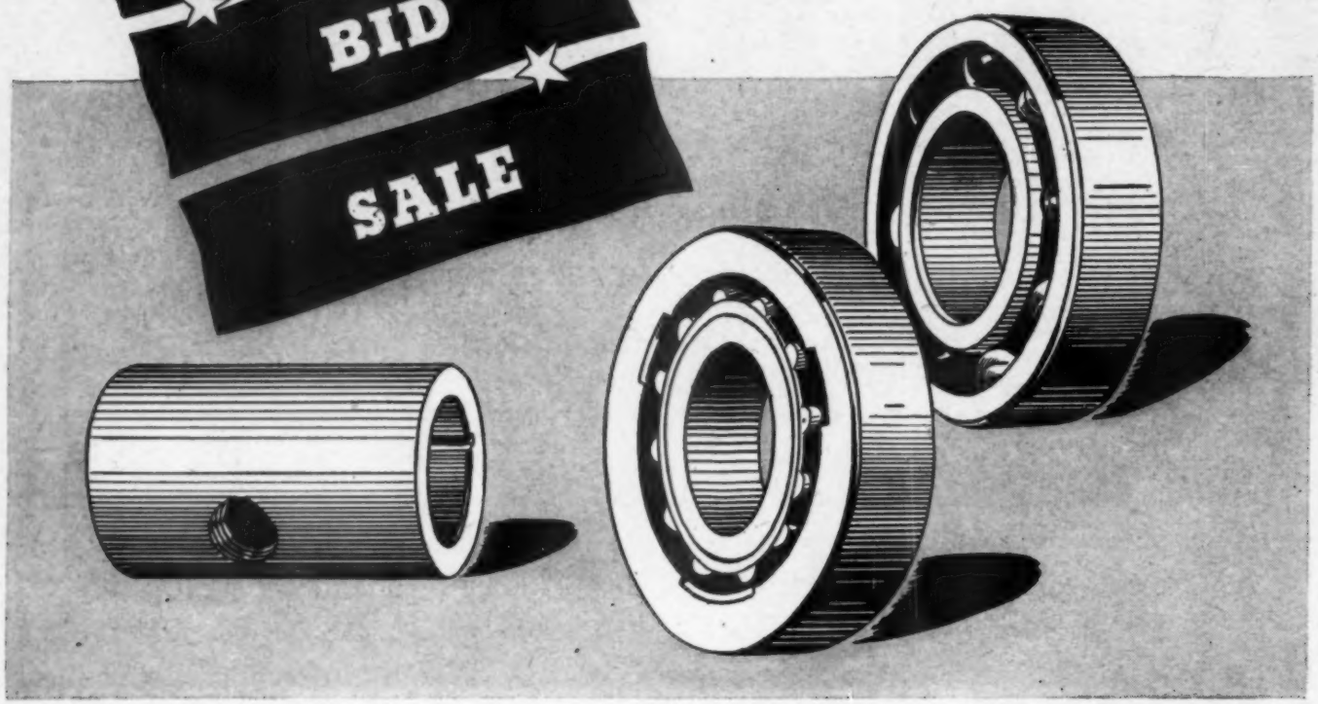

You can't go wrong when you get your bearings from the $23,000,000 stock now being sold by WAA. Friction and anti-friction bearings and components—all sizes and types—all unused and in top condition. Set your own price on what you need. Your nearest WAA Regional Office will give you all pertinent information on the sale and will assist you to make an inspection before submitting your bid.

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YOUR DOLLAR BUYS LONGER SERVICE IN

ROLLWAY

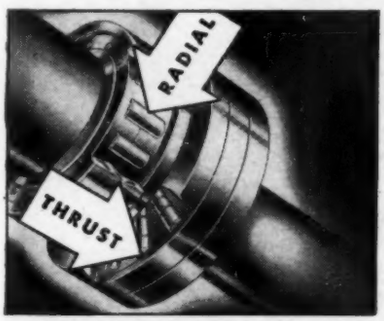
RIGHT-ANGLE-LOADED

BEARINGS

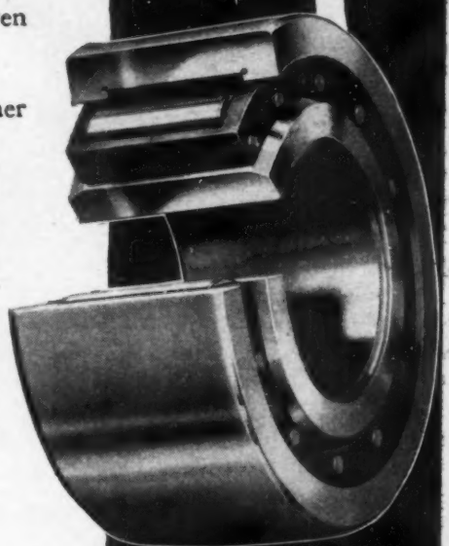
ROLLWAY's Right-Angle-Loaded Bearings have longer life because Rollway uses the principle of *right angle loading*. This splits every load into its component parts of pure radial and pure thrust. Each component load is carried on a separate bearing assembly at a *right angle to the rollers.*

For this reason, Rollway Bearings can use efficiently solid cylindrical rollers of greater mass and cross section area in a given space. The unit load per roller is lower and the load capacity for a given dimensional limit is higher.

As the diagram shows, no oblique loads or resultants, no other compound loads can pile up to increase the magnitude of the simple radial or thrust component. Resistance to shock and vibration is increased. Pinch-out of rollers is eliminated—with less rubbing friction and less wear-back of roller ends. The net gain is clearly apparent in longer bearing life . . . less service attention . . . and lower maintenance cost.



All radial loads carried at right angles to the roller axis. All thrust loads carried at right angles to the roller axis.



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When H & G goes to work for you

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— IDLE men at BUSY automatics.

— NOT BUSY men at IDLE automatics.

The former spells PRODUCTION . . . PROFIT; the latter spells NON-PRODUCTION . . . LOSS.

Based on a recent impartial survey, screw machine experts voted H & G Insert Chaser Die Heads their *number one choice.*

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Simple Strong Accurate

Sizes and Styles for all machines on which threads are cut

H&G Insert Chaser DIE HEADS

LITERATURE ON REQUEST

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* *Send for new catalog with tables of suggested torque values on general assembly, automotive assembly, etc.*

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Lighter, more accurate, this tap drives the tap by the square of the shank—holds it in alignment by the round—tap shanks are never "chewed up."

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This new high speed Procunier Tapping Head is the answer to your toughest tapping problems. It is a precision machine which assures greater tapping accuracy at high speed—with less tap breakage. Check these new Procunier features:

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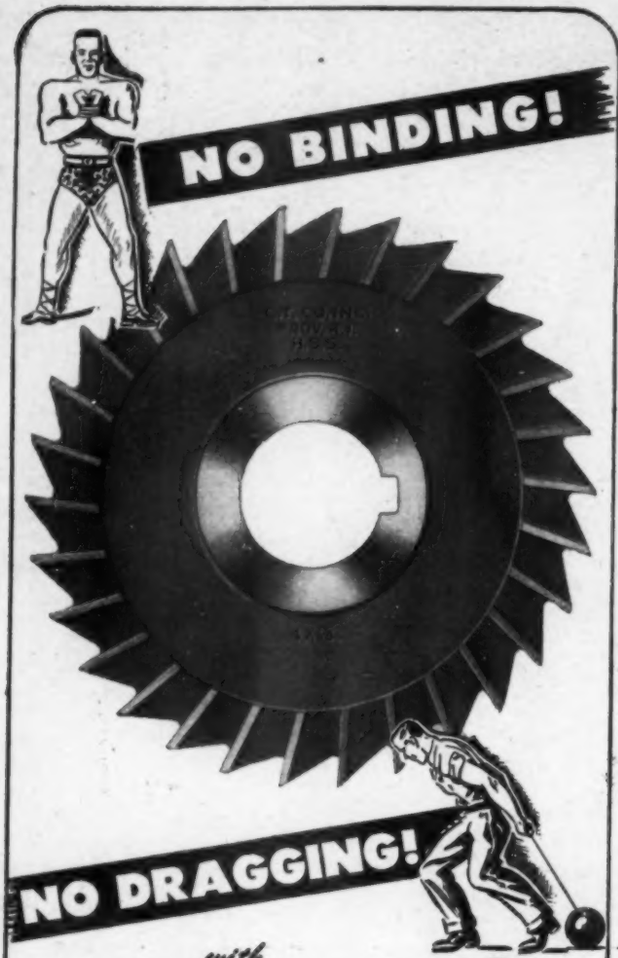

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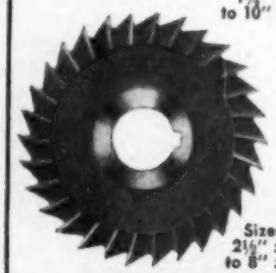
HOLLOW GROUND SAW
Sizes from 1¼" x 1/32" to 10" x 9/16"



SIDE CHIP SAW
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Here are two types of slitting saws for regular and heavy feed duty. The Circle R side chip slitting saw in particular is designed to take deep cuts, split chips and eliminate dragging. With all Circle R saws, in all sizes, there is no binding, no dragging.

For complete details and specifications on these and other Circular Saws, send for our Catalog L.

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The National Keyseating Miller mills, keyseats in one cut. It can be used on offset holes and blind holes. Work clamping is unnecessary. We also manufacture oil-grooving millers.

Made in twenty-seven different diameters from ½" to 3½". Several widths of cutters can be used in each size.

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NATIONAL MACHINE TOOL CO.
CINCINNATI, OHIO

STANDARD ENGINEERS NOTEBOOK

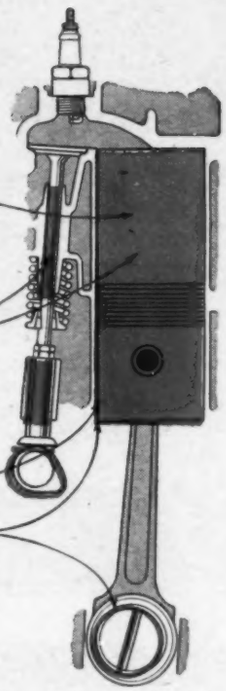
CALOL RPM

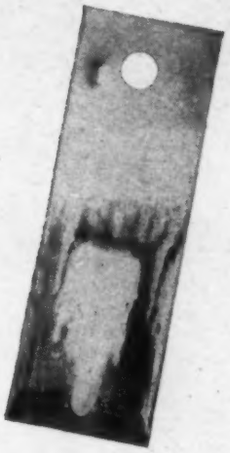
① Adhering agent in RPM Compounded Motor Oil keeps oil film on all parts after engine stops, even on cylinder walls.

② Rustproofing compounds prevent moisture that condenses on cooling parts from contacting metal.

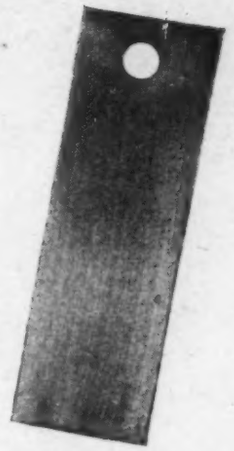
③ No rust is formed to scrape off when engine starts, and cause excessive wear.

④ Constant lubricant film provides adequate and instant lubrication when engine starts.





This actual photograph shows how one HIGH-QUALITY MOTOR OIL "peeled" off almost all of this test strip of steel when it was placed in corrosive-moisture conditions similar to those in a cooling engine. The oil concentrated at one spot and the unprotected surface quickly rusted.



RPM COMPOUNDED MOTOR OIL kept this strip bright and shiny, completely sealed against rusting, when it was exposed to the same conditions. "RPM" compounds keep a constant rust-proofing lubricant film on engine parts at all times, whether they are idle or moving.

How RPM Motor Oil Rust-Proofs As It Lubricates

Rusting, caused by corrosive moisture, is the greatest source of wear in automotive engines (85%, according to some engineers). It can be controlled by using RPM Compounded Motor Oil.

Additional compounding for "RPM," perfected by Standard of California scientists, provides a rust-proofing lubricant film on internal engine surfaces. The heaviest moisture condensation in idle or cold-running engines will not cut through it.

Other compounds in RPM Motor Oil give it adherent qualities so the film stays on parts at all times. They also loosen and remove gum and lacquer, lubricate hot spots, resist sludge formation, bearing corrosion and stop foaming.

Trademark "RPM" Reg. U. S. Pat. Off.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Colo.; Standard Oil Company of Texas, El Paso, Texas.

FOR EVERY NEED A STANDARD OF CALIFORNIA JOB-PROVED PRODUCT

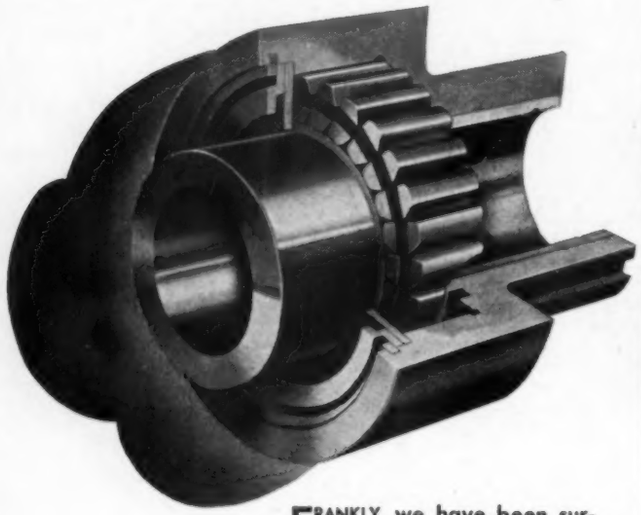
We learn something every day

ABOUT

FORMSPRAG

THE FULL COMPLEMENT

Over-Running Clutch



FRANKLY, we have been surprised to find there are so many different applications for Formsprag. We knew we had an outstanding product that would deliver high torque in a limited space, that would cut in and out hundreds of times a minute, that engaged positively and silently, that operated without backlash or vibration.

But we had no idea of the hundreds of different types of applications that Formsprag is now handling efficiently.

In manufacturing these many types it has been necessary to build Formsprag in many sizes and capacities, until we are now tooled up to produce a wide range of standard sizes, from 240 to 123,000 inch-pounds theoretical torque, in either plain or ball bearing types.

If you have, or think you may have an application, why not talk it over with us?

FORMSPRAG Company

1415 JARVIS • FERNDALE, MICH.

Just ONE setting per form

Just ONE continuous motion

"Fluidmotion"

FEATURES:

.0001" accuracy • Automatic Centering • "Fluidmotion" dressing • Dustproof and shatterless • hardened stainless steel • 7" & 14" wheel capacities • Highest quality diamonds.

Prominent users tell us that they consider "Fluidmotion" Radii & Angle Dressers the finest precision dressing instruments procurable—regardless of cost. They obtain greater accuracy, longer wheel life, and much faster setup and operation.

We'll be glad to send you complete information. Write

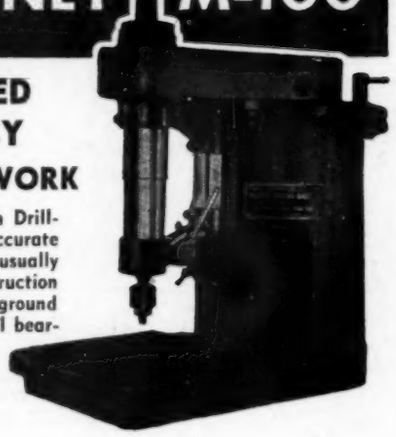
*Reg. U. S. Pat. Off.

J & S TOOL CO. 477 Main St. East Orange 1, N. J.

Representatives in Principal Cities

SIGOURNEY M-100

MAINTAINED ACCURACY IN PRECISION WORK



The Sigourney M-100 Bench Drilling Machine is extremely accurate on precision jobs. It is unusually sturdy and rigid in construction . . . has hardened and ground spindles . . . and sealed ball bearings throughout. All moving parts are entirely closed for maximum operator safety. M-100 is built for long and steady service.

This sturdily constructed bench drilling machine is available in 1, 2, 3, and 4 spindle models . . . speeds from 4,000 to 10,000 r.p.m.

Send for Illustrated Bulletin

THE SIGOURNEY TOOL CO.

Hartford 6, Conn.

Sole Sales Agents

PRATT & WHITNEY

Division Niles • Bement • Pond Co. West Hartford, Connecticut

ABRASIVES

WAA solicits bids for approximately $1,000,000 worth of abrasives of the following types: grinding wheels, abrasive cloth, paper, belts, sticks, stones and hones—all sizes and specifications. The offering includes both new and used materials; inspection may be made prior to bidding at any Regional Office holding the inventory. Priority claims have been satisfied and there will be no delay in delivery.

Sales of Abrasives will be held at frequent intervals. To receive information on future sales, write to the Regional Offices listed below asking that your name be placed on their mailing lists.

BOSTON • PHILADELPHIA • CHICAGO • CLEVELAND
DETROIT • ST. LOUIS • LOS ANGELES

OFFICE OF GENERAL DISPOSAL

WAR ASSETS ADMINISTRATION

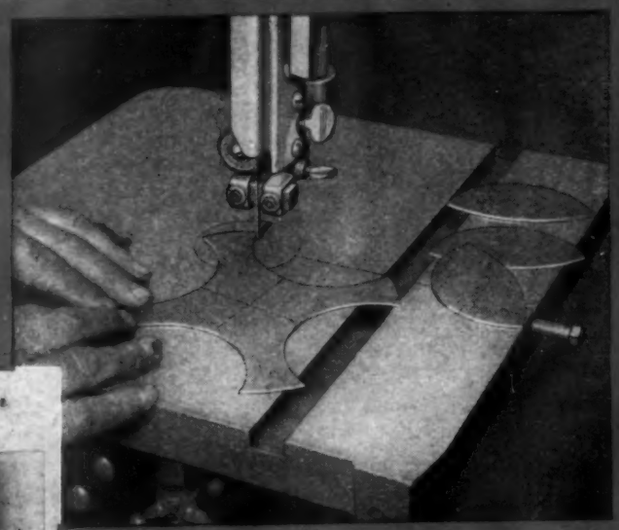
GOVERNMENT WAA SURPLUS

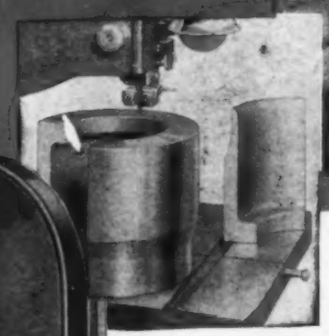
Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Tulsa

1020

- *Right:* In addition to using it for cutting cast iron jig and fixture bases 1½" and 2" thick to segments 6" thick, one plant uses its Delta Metal-Cutting Band Saw for all miscellaneous sheet-metal cutting, such as templates, structural shapes, parts for experimental machines, etc.

- *Below:* A machine-shop superintendent says that the Delta Metal-Cutting Band Saw saved its cost on the first few jobs of cutting draw-die segments as shown here.





4 metal-cutting speeds
•
1 wood-cutting speed

DELTA*
Metal-Cutting Band Saw

...quickly pays for itself on many applications

★ Cutting almost any material . . . steel, plastics, mica, fiber, carbon, vulcanite, etc.

★ Cutting templates.

★ Sawing off tool, die, and fixture stock.

★ Trimming gates in iron, brass, aluminum.

The low-cost Delta 14" Metal-Cutting Band Saw is an economical general-purpose unit for use in machine shops, tool rooms, experimental shops, foundries, pattern shops, and other places where many different materials must be cut.

Famous Delta construction features assure long, trouble-free life:

- Lubricated-for-life New Departure ball bearings.
- Simple, foolproof gear drive.
- Massive table mounted on double trunnions for rigidity.
- Guides that can be independently adjusted to micrometer accuracy.
- Guide controls at front of table for safety.
- Completely guarded, safety-type wheels, rimmed for easy tire renewal.
- Many other advantages that benefit you.

Enjoy the economy and versatility of the Delta Metal-cutting Band Saw. Install it in your plant. See your Delta distributor — listed under "Tools" in the classified section of your telephone directory.

Mail coupon below for free **Bulletin A-28.**

• • •

Delta tools are typical products of the American way of doing business. In America, we use tools to create more and better things at lower cost than in any other country, and in this way provide better living — for only as people work together to produce *more can they* have *more to enjoy.*

Delta Manufacturing Division
Rockwell Manufacturing Company
Milwaukee 1, Wisconsin

Specifications

Capacity:	
Blade to frame	13¾"
Under guide	6¼"
With height attachment (available separately)	12¼"
Speeds: With 1725 RPM motor	125, 175, 250, and 340 ft. per min.
With 1140 RPM motor	80, 114, 160, and 220 ft. per min.
(For woodworking there is one speed only of 2200 ft. per min., using a 1725 RPM motor.)	
Table: Dimensions	14" x 14"
Tilt	45° right; 10° to left.
Table from floor	42¾"
Overall height	65½"
Width	16½"
Front to back	24¾"
Blades	93½" regular; 105" with height attachment

M-20

*Trade Mark Reg. U.S. Pat. Off.

ROCKWELL DELTA MILWAUKEE

TEAR OUT COUPON AND MAIL TODAY!

DELTA MANUFACTURING DIVISION
608C E. Vienna Ave., Milwaukee 1, Wisconsin

Please send me Bulletin A-28 on Delta Metal-Cutting Band Saw.

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RED
"NOT GO"
Pat. Pending

GREEN
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NEW TESTED-ACCEPTED
THREAD RING GAGES

5-PLUS FEATURES

1. Greater accuracy and stability
2. Longer wear life
3. Less weight
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5. Positive adjustment

ACCURACY YOU CAN TRUST

WOODWORTH RING GAGES STILL PROVING "ON THE JOB" SUPREMACY OVER ORDINARY GAGES

No wonder more and more industries are adopting this gage as standard. Its revolutionary design assures wear life 5 to 7 times longer. And maintains accurate inspection.

This *proved* gage is easy to adjust, light in weight, durable—it's a *must* for cutting costs, increasing production. Just try the Woodworth Thread Ring Gage on your extra tough job—and you, too, will standardize!

Wire or write for folder No. 46R at no obligation.

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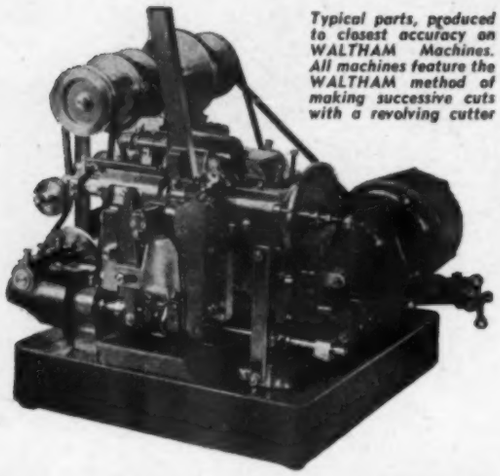
N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

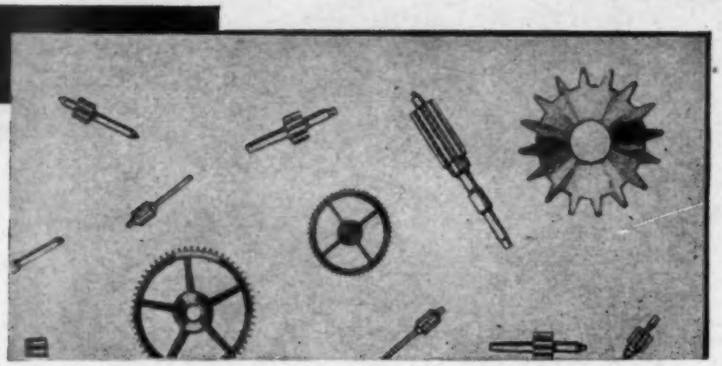
PRECISION GAGES • PRECISION MACHINE PARTS • DIAPHRAGM CHUCKS • ADJUSTABLE CLAMPING JIGS • SPECIAL TOOLS

WALTHAM
PINION & GEAR CUTTING MACHINES

for precision production of fine pitch mechanisms



Typical parts, produced to closest accuracy on WALTHAM Machines. All machines feature the WALTHAM method of making successive cuts with a revolving cutter



Single-Cut Pinion Machines This machine employs one cutter. Blank is positioned and machine started by hand, all other movements being automatic.

Multiple-Cut Pinion Machines Two or three cutters on arbor of cutter spindle make successive cuts. Machine stops on completion of last cut.

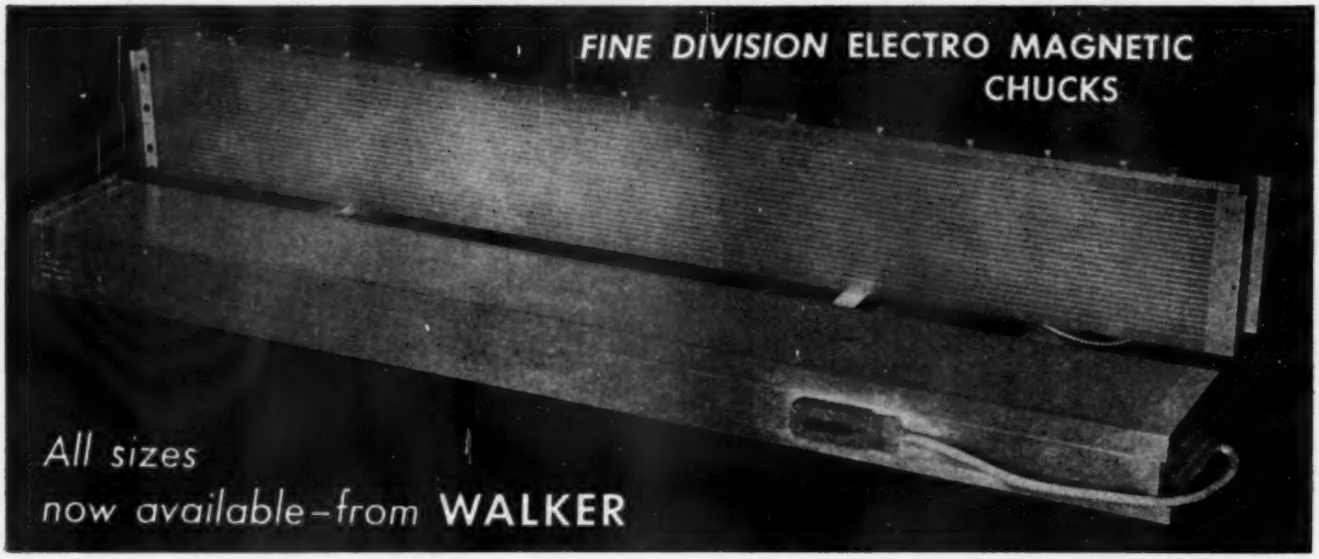
Magazine-Fed Pinion Machines Provides continuous production of one kind of pinion. Magazine is loaded and all other operations including cutting and ejecting are automatic and continuous.

Gear Cutting Machines Single and Multiple cut machines equipped with special cutter swing provide the means of cutting teeth on gears up to 1½" pitch diameter and in a stack ¾" to 1" long.

Write for literature giving detailed specifications

WALTHAM MACHINE WORKS
WALTHAM, MASS.

WALTHAM TRADE MARK REGISTERED U.S. PAT. OFF.



Heretofore the Fine Division Electro magnetic chuck was limited to comparatively smaller sizes in chuck design.

Walker Engineers have now developed this type of chuck in all required sizes making it possible to utilize larger equipment to operate and produce small parts on a mass production basis, thereby reducing cost.

You are invited to submit your poblems to Walker Co. for prompt solution.

O. S. WALKER COMPANY, INC., WORCESTER, MASS.
Makers of Rectangular, Swivel and Rotary Magnetic Chucks

Sleeve bearings are not damaged by microscopic particles in the air or the lubricant. Bunting Bearings should be handled with care and cleanliness, but do not require the observance of surgical standards for their successful use. Bunting Engineers are prepared to assist in designing new installations. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in Principal Cities.

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60

The **Diamo-Carbo*** dresser is Loaded and Aimed at top efficiency

YOU CAN save money and get better results on many jobs by using this DIAMO-CARBO dresser in place of diamond tools or common Huntington dressers. For instance, in forming special shaped wheels, turning delicate edges or turning all wheels up to "hard" grade, the DIAMO-CARBO is tops. Its long steel tube is packed with an extremely hard abrasive. You keep the tube ground back about 1/8th inch from the abrasive, support it on a tool rest and roll it back and forth lightly across the wheel face.

Only Desmond makes the DIAMO-CARBO dresser, and *only* Desmond makes a complete line of dressing tools. So, whatever your requirements, ask your distributor for Desmond dressers by name and be sure of getting *the right tool for the job.*

Write today for the complete Desmond catalog.

* *Patented*

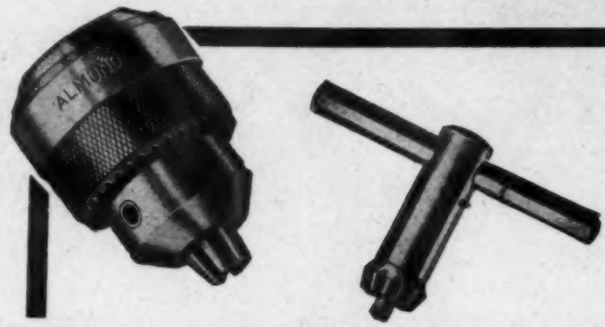
The DESMOND-STEPHAN Mfg. Co., Urbana, Ohio

Desmond

the only complete line of grinding wheel

DRESSERS & CUTTERS

BALL BEARING DRESSERS | REVOLVING CUTTER TYPE DRESSERS | DIAMOND HAND TOOLS AND NIBS | WHEEL TYPE DRESSERS | SIMPLEX STEEL-SLIDE VISES



Almond Drill Chuck

THE FIRST IN THE FIELD

ALMOND THREE-JAW DRILL CHUCKS were the first to be placed on the market over Seventy years ago. As Pioneers in the field of Drill Chucks, the name "ALMOND" has long been associated with the logical procedure of machine developments. ALMOND DRILL CHUCKS are made in types and sizes to fit all machine tools and portable drills.

Complete information is available on request.

The Original Manufacturers of Drill Chucks

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HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE

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DRILL HEAD 8 spindles

Adaptable to 14" x 17" Machines
6" Drilling Area

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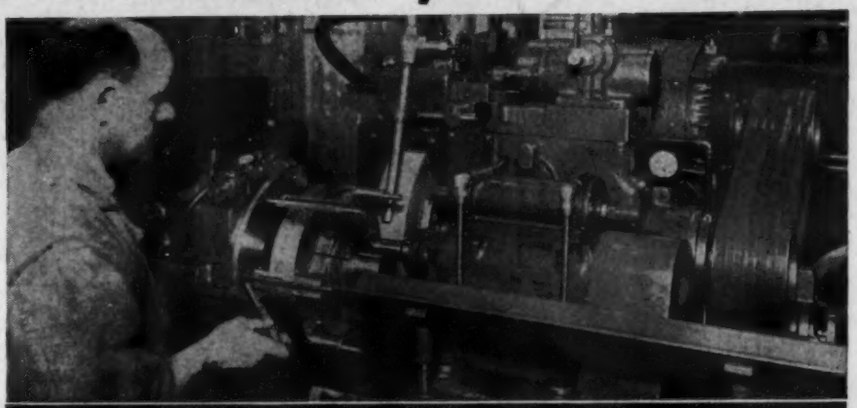
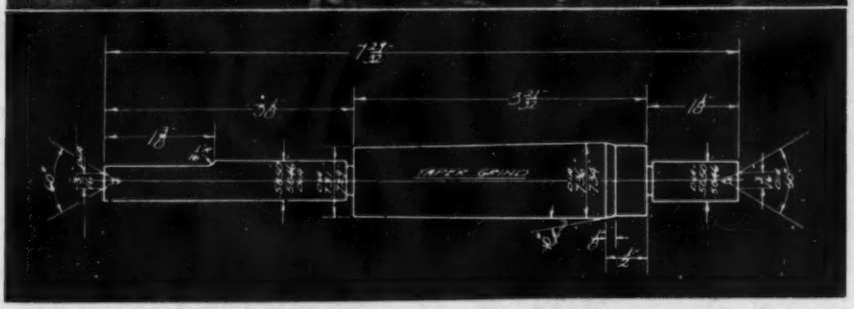
CINCINNATI 4, OHIO

ARTER—No. 135 Automatic Cylindrical Grinder for Shafts

Automatic handling of work with plunge cut grinding. This highly productive grinder maintains concentricity of diameters as the work is ground on centers.





Name of part—Washing machine motor shaft.
Material—S.A.E.B.—1112 CR Steel.
Stock removed—.012" average.
Limits—.0004" on bearing diameters.
Surfaces ground—three.
Production—300 finished pieces per hour.

ARTER GRINDING MACHINE COMPANY
WORCESTER, MASSACHUSETTS • U. S. A.

WE CAN'T TAKE CHANCES ON A 0.00008" TOLERANCE

• The "BRALE" Diamond Penetrator was designed by Wilson for use on the "ROCKWELL" Hardness Tester to test hardened steel—some hard alloys. Every one must be as nearly perfect as we can make it. Here's why:

A deviation in the indentation of 0.00008" (or 0.00004" in the "ROCKWELL" Superficial Tester) would cause an error of one point in the hardness reading. The reputation and universal acceptance of "ROCKWELL" Hardness Testers are based on dependable accuracy. We cannot risk the reputation and acceptance of "ROCKWELL" Hardness Testers by permitting any chance of error.

Every "BRALE" Penetrator is ground to shape under enormous magnification—tested on many test blocks to meet the exacting requirements of our Standardizing Laboratory.

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WE'VE BEEN CURING ILLS FOR A LONG, LONG TIME

Our line might be a shade different from the country doctor's but it surely parallels his. For 40 years we've been prescribing the right machine tools, and we'd appreciate this opportunity to help you. No job is too big for us to handle, or too small to receive our closest attention. Call on us any time.

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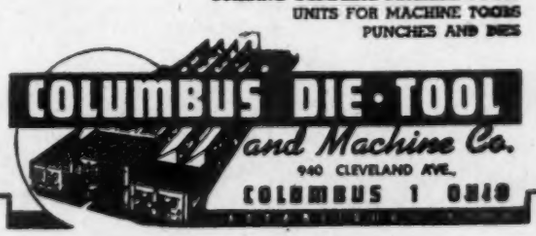
BUILDING COMPLETE MACHINE TOOLS
UNITS FOR MACHINE TOOLS
PUNCHES AND DIES



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Keep production on its toes by standardizing on . . . .

VITRIFIED GRINDING WHEELS

The Vitrified complete line includes also Silicate, Shellac and Resinoid bonded wheels for conditions requiring high finish, elasticity and heat resistance.

Grinding equipment—for tools or for production requirements—can be brought to higher degrees of precision and speed by standardization of Grinding Wheels.

These objectives can easily be realized through the use of Vitrified Wheels for every grinding operation, because Vitrified offers a complete line of sizes, shapes and types, processed especially for the work to be handled.

. . . Cast Iron, Bronze, etc., can be ground at low cost and efficiency on Vitrified Carborite Wheels. . . . For accurate, fast grinding of steel on a production basis, Vitrified Borite Grinding Wheels increase output and reduce costs.

. . . . Also, make Silicate, Shellac and Resinoid Bonded Wheels.

Ask a Vitrified representative to show you how economically you can modernize your grinding operations by standardizing on Vitrified Wheels.

Vitrified Wheels

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WESTFIELD MASS.

MECHANICAL MUSCLES

FOR EVERY LIFTING AND CARRYING JOB

Install PORTELVATOR. The Hamilton portable elevating table. One man can safely lift and carry loads previously requiring the strength of four.

Raises, lowers, transports. Three table surfaces. Accessible from four sides. Four point support. Standard model capacities, 1,000 to 5,000 pounds. Special models built on order.

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NICHOLSON EXPANDING MANDRELS

Save Time 2 Ways

1) By saving the time lost in making or looking for solid arbors.

2) By promoting precision.

Set of 19 does the work of 209 solid arbors. Hardened tool steel. Two types; all sizes. Sold singly or in sets. Bulletin 1043.

Other Products: Steam Traps, Control Valves, Arbor Presses, etc.

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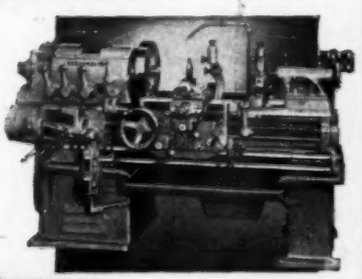
DIE CASTERS
DIE SINKERS
VERTICAL MILLERS
INJECTION MOLDERS



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WORCESTER 6, MASS. U.S.A.

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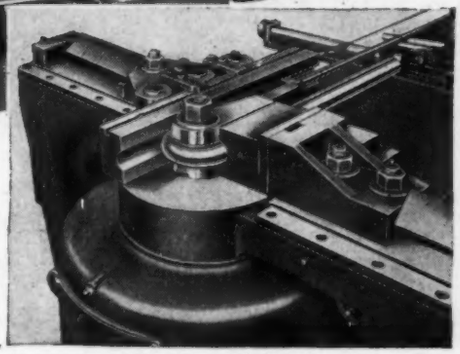
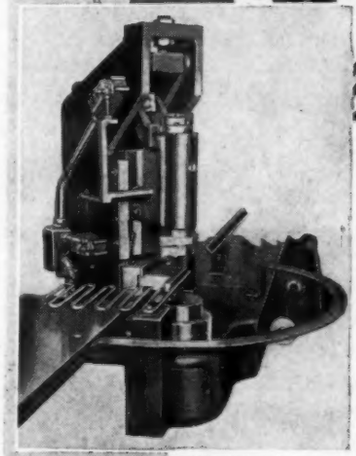
for Air Conditioning, Refrigeration and Sanitation Equipment

Push Button Control on all PINES Machines

FOR BOTH FERROUS AND NON-FERROUS METALS



Precision, Wrinkle-Free Bending of Sink Traps



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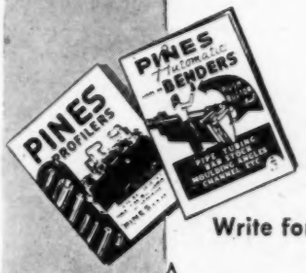
PINES HYDRAULIC BENDERS are built in 6 sizes for high speed bending of pipe, round and square tubing, angles, channels, extrusions and bars.

PINES BENDERS include many exclusive features such as automatic hydraulic angle-of-bend selector, mandrel rod stops, automatic feed cylinder, table and automatic solenoid-operated stop pin for supporting tube and determining position of bend.

PRODUCTION SPEEDS OF TYPICAL INSTALLATIONS: 1½" Brass Sink Traps—300 to 400 Bends per Hour. Serpentine Evaporator or Condenser Coils—600 to 1200 Bends per Hour.



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PINES AUTOMATIC PROFILER for chamfering, end facing, tapping, threading and boring tubing, pipe, and round bars at high production speeds.

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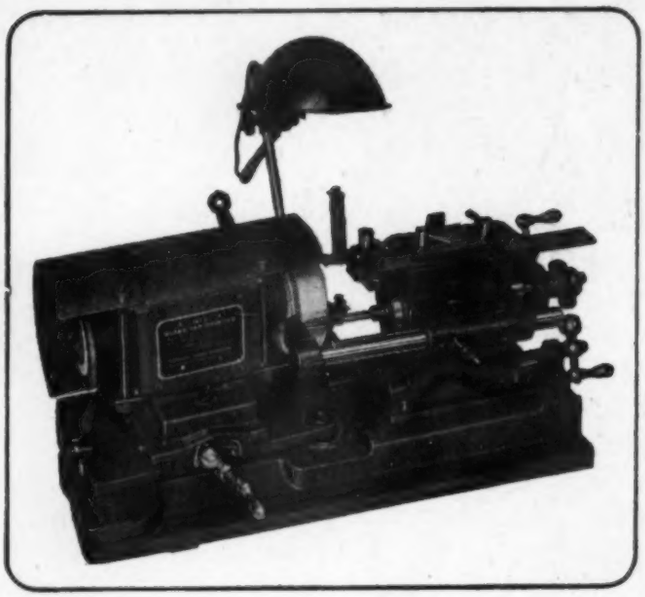

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The A. M. Co.: "Our Blake Tap Grinder has already paid for itself *in the first six weeks.* We have a *girl* trained to do all our tap sharpening in about two hours' time each day."

The C. T. Co.: "Our unit has already paid for itself *ten times over.* It is working three shifts a day and we haven't bought a stud bolt tap since its installation."

We have many similar comments in our files. One of our Blake Tap Grinders has saved as much as $30,000 worth of taps in less than one year. Another customer, who was getting 5,000 holes per tap, stepped his production up to 40,000 holes per tap through the use of a Blake.

The coupon below will bring you the full details of the fastest-sharpening, the easiest-to-use, and the most economical tap grinder ever made. Cut it out before you turn the page.

Please send me Bulletin No. 544 which describes the Blake Tap Grinder in detail. A.M.

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COMPANY _____

STREET _____

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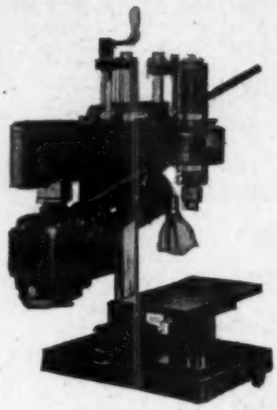
BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS—BLACK DIAMOND PRECISION DRILL GRINDERS—WALDOM CUTTER SHARPENERS



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HOLES

SMALL, ACCURATE PRODUCTION DRILLING

AT LESS COST PER HOLE

Hamilton Small Hole, Super-Sensitive Drills have many exclusive, patented features. Your small holes, .004" to 5/16", can be produced by these machines accurately and rapidly . . . and at less cost per hole.

Especially adapted to watch and clock manufacture and to the manufacture of instruments, business machines and other items where finest work must be performed on fast production schedules. These machines have stood the test of time. 80% of present installations are repeat orders.

Machines of various clearances, capacities and travel to fit your specific requirements. Write for bulletin.

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DIAMONDS FOR WHEEL DRESSING TOOLS
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Depend on WAA for the

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Through WAA you have a rare chance to get needed welders at minimum cost. All machines are of such well-known makes as Lincoln, Hobart, Westinghouse —all will give years of hard service.

★ ★ ★

TYPES AVAILABLE:

DC welding machines; electric motor driven generator; single operator type; 200, 300, 400 and 600 ampere capacity.

AC welding machines; single operator, transformer type; 300, 400 and 500 ampere capacity.

AC welding transformers for use in automatic arc welding process.

See our display booth at Western Metal Exposition and Congress Show at Oakland, California, March 22 to 27, 1947.

INVENTORIES ARE LOCATED IN THESE CITIES:

Atlanta	Little Rock
Boston	New Orleans
Birmingham	Houston
Cleveland	Portland, Oregon
Detroit	Philadelphia
Fort Worth	Richmond
Jacksonville	San Antonio
Louisville	Seattle
Los Angeles	San Francisco

Write to the above Regional Offices to have your name placed on the mailing lists for equipment of this type.

AT AMAZING LOW PRICES

Millions of pounds of welding electrodes, welding rods and welding wire of carbon steel, stainless steel and non-ferrous metals.

All are welders are sold under existing priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area, and then to purchase the materials offered herein.

EXPORTERS: Your business is solicited. If sales are conducted at various levels you will be considered as a wholesaler. Any inquiries concerning export control should be referred to Office of International Trade, Department of Commerce, Washington, D. C.

OFFICE OF GENERAL DISPOSAL

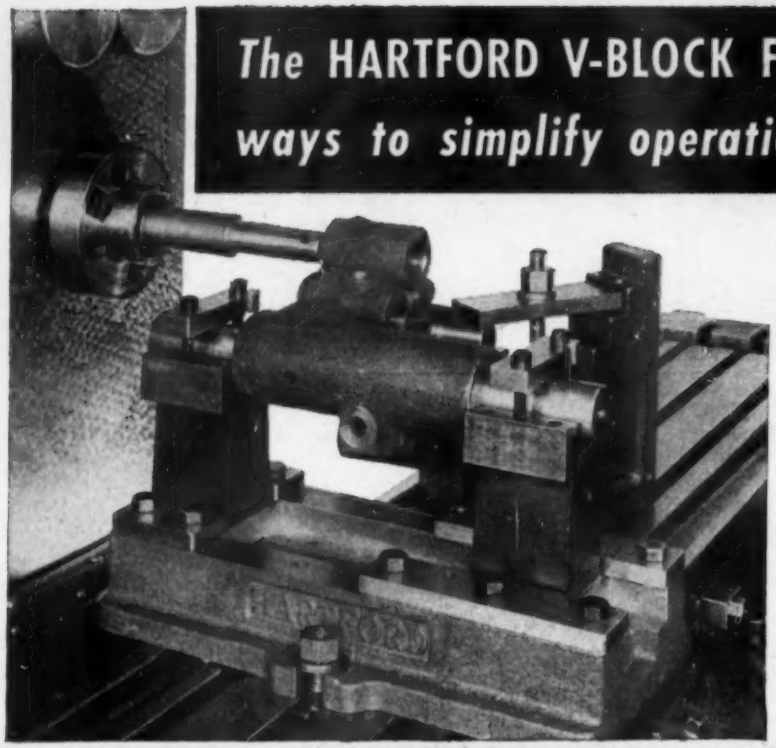
WAR ASSETS ADMINISTRATION

GOVERNMENT WAA SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis Nashville • New Orleans • New York • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Tulsa

1026

The HARTFORD V-BLOCK FIXTURE *provides many ways to simplify operations on irregular work*



Design of the Hartford V-Block Fixture and the holding accessories included in its equipment are such as to adapt it for many useful purposes. It is particularly applicable to boring, drilling and reaming. It is also widely used for inspection, because its accurately machined and scraped base provides for precise mounting on surface plates.

Illustrated here is a typical set up for an irregular casting being accurately bored on a milling machine. Set up is rapid and simple; the first hole is bored and the other holes in casting are then bored parallel to and in accurate relation to arbor.

It will pay you to explore the possibilities of this fixture on your work.

THE HARTFORD SPECIAL MACHINERY COMPANY

Makers of the "HARTFORD SUPER-SPACER"

HARTFORD 5, CONNECTICUT

Permanent marking gives your products identity, adds impetus to their sales, helps their proper use, as well as serving many uses during production, assembly, and distribution. Marking is a vital link from raw materal to ultimate use. Whatever your needs for marking, Noblewest makes the machines, tools, and dies to do the job faster, better, cheaper. Why not let Noblewest engineers analyze your marking requirements without obligation to you.

Write, NOBLE & WESTBROOK MANUFACTURING CO., 17 Westbrook St., East Hartford, Conn.

MARK IT BEST WITH

NOBLEWEST

Hi-Speed Marking Machines

CRAFTS DIAMOND TOOLS

Consistent Quality

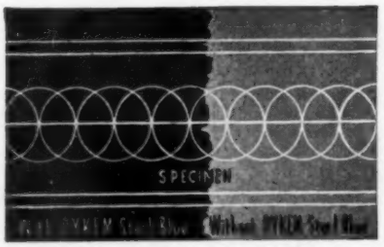
CARBIDE-TIPPED MACHINE SHOP GAGES AND TOOLS

ARTHUR A. CRAFTS CO., INC.
603 NEWBURY ST., BOSTON 15, MASS.
PLANTS: CHICAGO, DETROIT, BOSTON

DYKEM STEEL BLUE

STOPS LOSSES

making dies & templates



Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY, 2301B North 11 St., St. Louis, Mo.

In Canada: 2468 Dundas St. West., Toronto, Ont.

CUTTING TOOLS

$54,000,000 worth of cutting tools—thousands of types—are immediately available to those in the metal working industry who act quickly. The offering includes: cutting tools for machine tools, metal turning tools for metal turning machines, accessories and attachments for machine tools, and tool room specialties, all sizes and types. This entire inventory is being sold on sealed bids and will go at bargain prices to those who inquire—inspect—invest. Get full particulars from your nearest WAA Regional Office today—see the tools you wish to buy—then submit your bid.

Sales of Cutting Tools will be held at frequent intervals. To receive information on future sales, write to the Regional Offices listed below asking that your name be placed on their mailing lists.

BOSTON • PHILADELPHIA • CINCINNATI • CHICAGO
CLEVELAND • DETROIT • ST. LOUIS • LOS ANGELES

OFFICE OF GENERAL DISPOSAL

WAR ASSETS ADMINISTRATION

GOVERNMENT WAA SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Omaha • Philadelphia Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Tulsa

1022

SELECT

Speed-Right

FOR YOUR
SMALL HOLE DRILLING

Instant finger-tip speed adjustment for rapid set-up
The Right drill speed accurately maintained for maximum production and minimum drill breakage
Rugged construction for lasting accuracy
Selective Quill Feed for smoothness with extreme sensitivity

Bulletin 202

The ELECTRO-MECHANO Co.

261 E. Erie St., Milwaukee 2, Wis.

8" Bench Drill Press for holes .064" to 5/32" .0001" Chuck run-out. The speed you want within 1000 to 10,000 or 2500 to 15,000 RPM speed range.

Available for IMMEDIATE DELIVERY

HUB POWER PRESS

for speed, accuracy and economy

These convenient, high speed, power presses will handle materials with ease and convenience. Assures high production of parts at lowest cost.

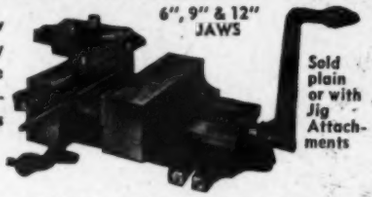
Made in 4½, 6, 15 and 27 ton capacities

Inquire about the new 27 ton machine.

WILLIAM F. BREWER MACHINE CO.
75 LAUREL STREET HARTFORD 6, CONN.

GRAHAM MULTI-PURPOSE VISE

The Bulletin offered below pictures an amazing variety of uses where this Jig Vise can eliminate making special jigs or fixtures. Sizes up to 124 lbs.



REQUEST NEW BULLETIN 41

completely illustrating and pricing the above Vise and Attachments, also our famous

"Adjust-angle" Knurl Holder Fitting Lathe Turret

GRAHAM MFG. CO.
84 BRIDGE ST., EAST GREENWICH, R. I.

Original System of Inserted Blade

OK *Milling and Boring Tools*

See Issue January 16th, 1947 American Machinist

THE OK TOOL CO., INC.
SHELTON, CONN.

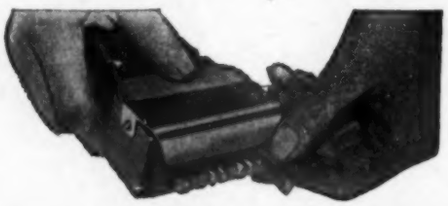
BENEFIT

When Hiring by Consulting Your Local

SERVICE MEN'S CENTER

MARK

THE FAST WAY



WRITE FOR LITERATURE AND PRICES OF LATEST
HERCULES HOLDERS & TYPE

The ACROMARK Company

7-13 MORRELL ST., ELIZABETH 4, N. J.

BUZZER INDUSTRIAL *Gas* EQUIPMENT

'Reg. U.S. Pat. Off.

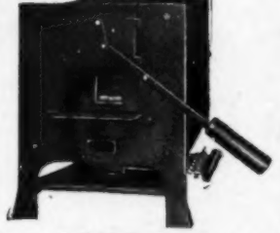
NO BLOWER OR POWER NEEDED TO REACH HIGH TEMPERATURES WITH A "BUZZER" GAS FURNACE . . . JUST CONNECT TO YOUR GAS SUPPLY.

Rectangular Heat Baths

For liquid heat treating baths, soft metal melting, etc.

The High Speed Full Muffle Furnace quickly attains a temperature of 2400° F., and is designed for High Carbon and Alloy Steels.
"BUZZER" Rectangular Heat Baths meet the increasing demands liquid Heat Bath Furnaces and Metal Melting. Also made in round pot furnace type.
Send for the "BUZZER" Catalog showing full line of Gas Furnaces, Burners and other equipment.

ATTAINS 2400° F. QUICKLY



Full Muffle Furnace (Bench Type)

CHARLES A. HONES, INC.
121 South Grand Avenue Baldwin, L. I., N. Y.

Announcing

BRITISH INDUSTRIES FAIR

LONDON & BIRMINGHAM, MAY 5—16, 1947

This is your first opportunity in seven years to see your old suppliers in Britain and to meet new ones.

Overseas Buyers are invited to Britain for the 1947 British Industries Fair. It will enable them to establish personal contact with the makers of the immense range of United Kingdom goods displayed in the London (Lighter Industries) and Birmingham (Hardware & Engineering) Sections of the Fair. The careful grouping of exhibits will assist buyers to compare the products of competing firms with a minimum of time, trouble and expense. Special arrangements to suit individual markets can be discussed and terms and conditions of business settled direct with the manufacturer, since only the actual producer or the sole selling agent may exhibit.

★ *For full details of the* 1947 *Fair apply to the nearest British Commercial Diplomatic Officer or Consular Officer, or the British Trade Commissioner in your area.*

BRITAIN PRODUCES THE GOODS

MACHINERY
will be shown in Birmingham

Smooth, Fast, Accurate Lifting, Pushing or Pulling of Loads

CURTIS AIR HOISTS

Because air-powered cylinders lift, push or pull with speed and accuracy, Curtis Air Hoists and Cylinders are cutting labor and production costs. From bakeries to foundries, dairies to automotive parts, Curtis Air Hoists have proved their value in solving many load-handling problems.

- Low original cost — minimum operating and maintenance expense
- One-man operation — finger-tip control
- Immunity to abuse or overloads
- Light weight — pendant, bracketed or rope-compounded types
- Capacities up to 10 tons

See how Curtis air-operated hoists and cylinders speed production and reduce handling costs. Write for Bulletin C-7 today.

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1924 Kienlen Avenue, St. Louis 20, Missouri

CURTIS PNEUMATIC MACHINERY DIVISION H-540A
of Curtis Manufacturing Company
1924 Kienlen Avenue, St. Louis 20, Missouri
Please send me Form C-7 on Curtis Air Hoists, Air Cylinders and Curtis Air Compressors.
Name.....
Firm.....
Address.....
City..... Zone..... State.....

93 Years of Successful Manufacturing

Don't Risk THE WRONG FLUX

• Good soldering jobs depend on the right flux—and Kester has the right flux for you. You can count on Kester for a flux that will properly clean, prevent oxidation, make way for a tight bond that will resist shock, vibration, twisting, bending, and the contraction and expansion of temperature extremes.

• Growing out of nearly half a century of practical experience, Kester's hundreds of flux formulas have been time-tested in laboratory and industry, to establish exact specifications for every flux need. Among them is the ideal flux formula for your particular soldering job.

• Consult Kester engineers at any time for practical, experienced help with flux problems. They'll gladly suggest the right flux to protect your product. A letter today will bring expert Kester assistance . . . without obligation.

KESTER SOLDER COMPANY
4223 Wrightwood Ave., Chicago 39, Illinois
Eastern Plant: Newark, N. J.
Canadian Plant: Brantford, Ont.

KESTER
Solder Fluxes
STANDARD FOR INDUSTRY

CONTRACT WORK

Wood Patterns and Metal Patterns
For
All Types of Castings
Complete Machine Shop Facilities
Let us know how we can serve you
Elram Pattern Works
214-220 Adams St.,
Hoboken, N. J.

WANTED PRODUCTS OF CONTRACT WORK

Machinery manufacturing concern with extensive experience desires a product to manufacture on a contract basis or straight contract work.
Manufacturer has modern well equipped machine shop, capable of making small, medium or large machinery, tools, jigs, fixtures, gages, stamping dies, stampings, electronic assemblies, gear drives and small parts of all types. Excellent engineering facilities and good contacts for all types of foundry work are available.
Send for our bulletin #10A
C. W. JARVI MFG. COMPANY, INC.
NORTH ATTLEBORO MASSACHUSETTS

CANADIAN COMPANY

Located in Montreal is interested in manufacturing or assembling your product in Canada on a contract basis.

Our plant is well equipped to do first class machine work.

Would, if desired, act as representatives and distributors.

BOWERS MACHINE CO., LTD.
5860 St. Lawrence Blvd., Montreal, P.Q.

ENAMEL SPRAYING

and baking contracts wanted. Completely conveyorized system throughout. We guarantee every job.

For better finishing write

G & W PLATING CO.
1357 Seneca Ave. Bronx 59, N. Y.

CHUCKING WORK WANTED

For 8 and 6 spindle Bullard Mult-au-matics up to 17" dia. And 4 spindle Gridleys up to 9" dia.

Can Handle LARGE Quantities

MARS MANUFACTURING & MACHINE COMPANY
MARS, PENNA. PHONE 28

O. P. HELD

HAS

AUTOMATIC and HAND SCREWS

Up to 1¼" capacity for your job in stainless or any other material. Any quantity. Take advantage of the attention our shop can give to your order.

2110 WESTCHESTER AVE., N. Y. 61, N. Y.
Tel. UN 3-2545

SCREW MACHINE PRODUCTS

To Your Requirements, Capacity 2⅝" Diameter. Production Milling & Drilling.

J. W. BRINSER & SONS
317 GILPIN ROAD WILLOW GROVE, PA.

La Salle Engineering Co.
TOOLS, PRODUCTS, SPECIAL MACHINES; DESIGN & BUILD
CHICAGO
LOS ANGELES
NEW YORK

SEND B.P. FOR
MFG. COMPLETE ASSEMBLIES
Tool—Jigs—Dies
Screw Machine and Turret Lathe Work
Stampings—Gears
POSSY'S TOOL & MFG. CO.
51 Meadowbrook Buffalo 6, N. Y.

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them
GENERAL PATTERN WORKS
2233 Buck Street Cincinnati, Ohio

● Plates—Flame cut to size and shape—latest burning equipment. Can furnish our own steel—accurate work—prompt service.
● Equipped to do welding and fabricating in connection with this service. Send us blueprints or templet for quotation.
THE TOLEDO IRON AND STEEL CO.
A Complete Steel Warehouse Service
1819 STARR AVENUE, TOLEDO 5, OHIO

Your inquiry will have special value . . .

If you mention this magazine, when writing advertisers. Naturally, the publisher will appreciate it . . . but more important, this proof of active reader interest will demonstrate to theadvertiser the usefulness of—and demand for—the vital service rendered by his advertising.

SEARCHLIGHT SECTION

Employment • BUSINESS • OPPORTUNITIES • Equipment—Used or Resale

POSITIONS VACANT

WANTED: Experienced Design Engineer to design precision machines and equipment for rebuilding internal combustion engines, principally automotive. Excellent opportunity promising permanency and advancement offered by progressive, old-line company in middle-west. Write today giving complete personnel history, enclosing recent photograph or snapshot. All information confidential. P-838, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED MAINTENANCE Supervisor to conduct repair work in two steam electric powerplants developing 200,000 KW; age 30-45; must be familiar with maintenance of turbines, oil-fired boilers and auxiliary equipment; locate Southern California. P-870, American Machinist, 68 Post Street, San Francisco 4, California.

MACHINE SHOP General Foreman or Superintendent. Well established company in Philadelphia is interested in securing the services of a man experienced in the general supervision of a machine shop employing large machine tools on heavy miscellaneous work. Must have thorough knowledge of tooling for large planers, millers and boring mills. Knowledge of cutting feeds and speeds essential. Experienced with incentive wage plans and standard costs. Know jig and fixture design. Company enjoys excellent labor relations and is interested in developing new lines of work in addition to its regular established products. Applications will be treated as confidential and should give full particulars as to education, experience, personal data and references. P-887, American Machinist, 330 W. 42nd St., New York 18, N. Y.

POSITIONS VACANT

MACHINE TOOL Painter with experience wanted by middle-west shop. Apply by letter giving age and qualifications. P-885, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

MACHINE SHOP Foreman with proven supervisory background, preferably with experience in shop doing machine development work. Located outside of Somerville, N. J. P-886, American Machinist, 330 W. 42nd St., New York 18, N. Y.

DESIGN DRAFTSMAN—position in Princeton, New Jersey. Not interested in tool or die draftsman. Experience in kinematic and static mechanical design problems required. Knowledge of electrical and electronic design desirable. Salary dependent upon qualifications. Write Post Office Box 708, Princeton, New Jersey.

EMPLOYMENT SERVICE

SALARIED POSITIONS $2,500-$25,000. This thoroughly organized confidential service of thirty-seven years' recognized standing and reputation carries on preliminary negotiations for supervisory technical and executive positions of the calibre indicated through a procedure individualized to each client's requirements. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details. R. W. Bixby, Inc., 266 Dunn Bldg., Buffalo 2, N. Y.

Additional Employment Ads on page 350

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE

(Not available for equipment advertising)

60¢ per line, minimum 4 lines. To figure advance payment count 6 average words as a line.

POSITIONS WANTED (full or part-time individual salaried employment only), ½ above rates.

PROPOSALS. 50 cents a line an insertion.

INFORMATION

BOX NUMBERS in care of any of ourNew York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE:

The advertising rate is $8.00 per inch for all advertising appearing on other than a contract basis. .Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30inches —to a page. A.M.

NEW ADVERTISING received by 10 A. M. March 5th will appear in the issue of March 13th subject to limitation of space available

POSITIONS WANTED

MANAGEMENT ENGINEER Graduate 25 years of successful background in capacity of top "Production Executive" and "Chief Industrial Engineer". Excellent record of increasing production and reducing costs. New York resident. PW-884, American Machinist, 330 W. 42nd St., New York 18, N. Y.

GEAR HOBBER and Threadmiller Serviceman with 11 years' road experience desires position in methods or foremanship in gear works. Former work consisted of troubleshooting, maintenance, and setup of single and rotary hobbers, threadmillers, and gear grinders, familiar with competitive makes of machines. PW-883, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

MECHANICAL ENGINEER, age 30, graduate B.M.E. in 939, 8 years' continuous experience on production methods, tooling, inspection, design, and development of precision products. Desires position of responsibility and opportunity. PW-888, American Machinist 330 W. 42nd St., New Yorkl 8, N. Y.

PRODUCT ENGINEER. A well educated man, thirty-eight years old, and a member of "The American Society of Tool Engineers", who has a nicely varied background in all branches of manufacturing to fit him for a position as a Chief Engineer or Assistant. Now employed. PW-889, American Machinist, 330 W. 42nd St., New York 8, N. Y.

INDUSTRIAL MECHANICAL Engineer—Age 34, well balanced background in industry. Ability to carry complete manufacturing responsibility. Detailed in Production Engineering—Cost Control, Process and Methods, Purchasing, Personnel and Labor Relations. Six years at present position in the heavy machine and engine business. PW-890, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

SELLING OPPORTUNITIES WANTED

ESTABLISHED IMPORT & export firm located in Shanghai, China, desires additional connection with leading manufacturers. References furnished. Address: Ray Snyder c/o Dean Company, 26 O'Farrell Street, San Francisco 8, California.

MECHANICAL ENGINEER with following in New England and New York states, 25 years' experience selling high grade machine tools desires line of machines or tools of merit. Excellent background and knowledge of shop and manufacturing methods. P. O. Box 53, New Britain, Conn.

MANUFACTURERS AGENT in Indiana desires additional lines sold to the Tool Shops and Industrial Plants. RA-891, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

CALIFORNIA OR West Coast coverage on manufacturers representative basis wanted by graduate mechanical engineer with 13 years production and sales experience. Will give aggressive and intelligent sales coverage to eastern manufacturer of production shop equipment, supplies, or material. Post Office Box 2631, Terminal Annex, Los Angeles 54, California.

INDUSTRIAL DESIGNER

With executive experience having styled major products for biggest name manufacturers for over 15 years would like position with manufacturer of wide range of durable goods and appliances as design head. Complete history furnished on request. Address inquiries to: "DESIGNER", 648 Burlingame, Detroit, Mich.

PATENT ATTORNEY

PATENT and Trade-Mark Practice bofore U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request, Lancaster Allwine & Rommel, Registered Patent Attorneys, Suite 453, 815-15th Street, N. W., Washington 5, D. C.

MODELS

PLANT LAYOUT MODELS MADE TO SPECIFICATIONS

MACHINE TOOL PROTOTYPES A SPECIALTY

HOOSICK MODEL CO.
PETERSBURG, N. Y.

PETITT BROS. MACHINERY CO.

If You Want to Buy, Sell, or Trade One Machine or Entire Plant Consult Us Immediately

FRED PETITT — ALBERT PETITT
OFFICE AND WAREHOUSE

1240 WEST 4th ST. CHERRY 0609
CLEVELAND 13, OHIO

PROFESSIONAL SERVICES

DESIGN & DEVELOPMENT SERVICE

Designers—Engineers—Builders

Automatic & Packaging Machinery

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YARDENY ENGINEERING COMPANY

REMOTE CONTROLS (Wires and Wireless) AUTOMATIC DEVICES

Electronic • Electrical • Mechanical Consultation • Designing • Manufacturing Licensing

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Worth 2-3534, 3535

WORLDWIDE DESIGN SERVICE

Consultants

Products—Special Machines. Processing & Tooling —Low & High Prod. Patent Drawings—Service Manuals. General Drafting. For Individuals & Small Manufacturers. A Complete Engineering Service by Mail.

P. O. BOX 224 ROCHESTER, N. Y.

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AGENTS REQUIRED

to sell in U.S.A. the Finest Stamps in the World

—the famous British "Modelmark" steel letter and figure stamps and interchangeable type. They sell on sight against any other brand.

Only agents selling quality goods in the Engineering Industry need apply. References required.

The Standwell Equipment Co., Ltd.
Axminster, Devon, England

PRECISION REBUILT MILLERS

90 day guarantee

K & T #1B Full Universal

K & T #2BS Plain

Both Geared Head Single Pulley Drive, Double Over Arm

B & S #2B Heavy Plain—Geared Head Single Pulley Drive, with Vertical Slotting Head

SMITH MACHINE TOOL CO.
Spencer & Jackson Sts.
ALBANY 4, N. Y.

FOR SALE

LATHE

One 14" Barnes Lathe with 24" swing over gap. Price $500.00.

AIR COMPRESSOR

Packed for shipment one Schramm 260 C. F. M. A. 125 P. S. I. Air Compressor, complete with 60 H. P. Westinghouse induction motor, Receiver, after cooler switches, etc.

SOUTHERN PLASTICS CO.
911 Huger St. Columbia, S. C.

PRESSES FOR SALE

Rogers Hydraulic Presses. 125 ton, 15" stroke, 18x28 platens. Complete with self-contained hydraulic power units and motors. Never been used. Only $850.

JOHN W. RIX CO.
338 N. Quentin, Wichita 8, Kansas

EVERY ITEM GUARANTEED AS REPRESENTED

FALK FOR DEPENDABILITY IN REBUILT MACHINERY

AUTOMATICS

2—#00 Brown & Sharpe Full Automatic, Standard Speed

1—1¼" Cone 4-spindle Automatic, Motor Driven, Threading Spindle

1—#515 National Acme 9/16" 4-spindle Automatics, complete

LATHES

10"x24" Logan Q.C.G. Lathes (new)
Sebastian Engine Lathes (new)
13"x6' Williard, geared head
14"x6' Hendey Yoke Head
14"x6' Rockford Cone drive (two)
16"x6' American Motor Driven Lathe
16"x8' Lodge & Shipley 12-speed Grd. Hd.
18"x10' American, Geared Head, Taper
20"x10' Hendey with Taper
20"x11' Schumacher-Boye, M.D.
24"x12' LeBlond Heavy Pattern
24"x24" American Lathe, motor dr.
26"x18' Bridgeford geared head
28"x10' Davis cone driven
32"x16' Bridgeford geared head
48"x30' Simmons Geared Head, 1941

TURRET LATHES

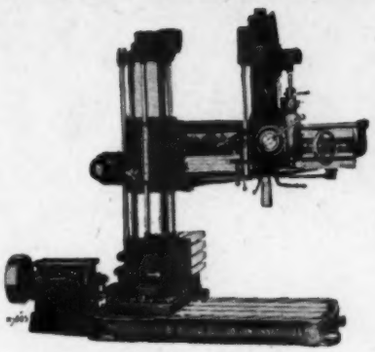
4—#4 Warner & Swasey Hand Screw Machines, arr. Motor Drive
2—#4 Warner & Swasey Universal Turret Lathe, Motor Driven
16" Warner & Swasey Brass Lathe
#2A Warner & Swasey Universal
#3R Gisholt Universal like new
#4 Foster GFH Hand Turret Lathe
3—Merey #2G Geared Head Turret Lathe, motor drive (late model)
2—Simmons #2 (microspeed) Turret Screw Machine (late model)
Bullard 42" Vertical Turret Lathe

TURRET PUNCHES

Hecker, vertical type, 8-station, air operated, 18" throat

PLANERS

20"x20"x24" N.B.P., Planer Shaper
26"x26"x8' Gray Planer, 2 heads



RADIAL DRILLS

3½' Arm, 10" Column Cincinnati-Bickford
4' Arm, 11" Column Cincinnati-Bickford
5' Arm, 13" Column Cincinnati-Bickford
5' Arm. 14" Column Fosdick, motor drive
6' Arm, 15" Column Cincinnati-Bickford
Cincinnati-Bickford 5' Arm, 13" round column with air clamp. Oil grooved, tee slotted base, side base, with plain box table with #5 Morse Taper spindle. Motor drive.

FOUNDRY MOULDING MACHINES

2—#0 Johnston & Jennings, Jolt Squeezer Draw Pattern, 15" x 21" Table
3—#342 Osborn Jolt Rollover Pattern Draw Moulding Machines, 23"x38" table
2—SPO Hand Rollover Power Draw Moulding Machines complete with run-out cars 22½"x60"

SHEARS & METAL WORKING

Lennox Splitting Shear ¾" cap.; 8' throat
Lennox Bevel Shear, ¼" cap.
Peckstow 30"x18 ga. Squaring Shear
Niagara 48" Roller Leveller, 6 Rolls
West Co. 36" x 16 ga. 15" gap, Power Squaring Shear

MILLING MACHINES

#3, #4, #5 Cinn. High Power, Plain, S.P.D.
#1-#1½ Brown & Sharpe Plain Miller
P & W 2½" Duplex Spline Miller
Thread Miller, Hall Planetary #1—24"
#8 Lees Bradner Thread Miller
#1, #2 Kempsmith Plain Millers
#3B Hendey Universal Miller, motor drive
#4 Cinn. Vertical High Power Miller. (2)

MISCELLANEOUS

15 KVA Ace Spot Welder, 18" throat.
Toledo Spot Welders, 10 K.W., 15 K.W.

GRINDERS

Queen City Dble. End Grinders, new
#33 Abrasive Vertical Surface motor drive
#3 Abrasive Horizontal Surface
12" No. 22 Heald Rotary Surface Grinder
16" Persons-Arter Rotary Surface Grinder
1—Gardner Dble. Opposed Grinder #14
1—Seybold 96" Knife Grinder
Oliver of Adrian Drill Grinders
Cincinnati Centerless Grinders #2 M.D.
#12 Greenfield Internal Hydromatic Grinder, sizematic type
#2 Brown & Sharpe Surface Grinder
#70 Heald Internal Grinder
#60 Heald Cylinder Grinder
10"x18" Norton Cylindrical
2—Cincinnati, #1½ Tool & Cutter Grinders

BORING MILLS

3½" Bar Landis-Rochester Horizontal Boring Mill, Model #36
#31 Lucas Horizontal Boring Mill, 3" bar

DRILLING MACHINES

Avey, 2 & 3 spindle Prentice, 4 spindle
Henry & Wright, 6 spindle, #2 M. T.
Fosdick 13" Super speed 4-spindle drills
Natco #12, 12 spindle #1 M. T.
2—Natco #14, 22 spindle Rectangular head Drilling Machine, #2 M. T.

POWER PRESS HEADQUARTERS

Famco Arbor & Foot Presses (new)
2—#1A Standard Bench Type Press, ¾" stroke
#4 Bliss D. C. Forging Press
200 ton A.C.F. Hydraulic Press. Bed. 24"x36", 4-post.
Hilles & Jones #4 Single End Punch and Shear. Equipped as Plate Shear with 18" Blades. ARR, motor drive, 48" throat

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MODERN MACHINE TOOLS
LOW PRICES

ENABLES YOU TO REPLACE
OBSOLETE EQUIPMENT

NEARLY

AUTO. SCREW MACHINES

BILLINGS & SPENCER B-2 Diametic—Latest
Cleveland ⅞" to 2½" Model A
CONOMATICS 3½" 4 spindle—latest type
CONOMATICS 2¾"—6 spindle, Latest Type
NATIONAL ACME 9/16" mod. C, 5 spdle., M.D.

BORING MILLS—Horizontal

DETRICK & HARVEY—5" bar—floor type—motor drive
FRANKLIN 4½" bar, single pulley drive
LANDIS #35—3½" bar—floor type
LUCAS #33—4½" bar, motor drive
NILES BEMENT POND 5", 6", 7" bar—floor type
OHIO #5F-420 5" bar, floor type, latest type
P & H #16, 3½" bar, floor type, M.D.
UNIVERSAL #40—4" Bar, Motor Drive

BORING MILLS—Vertical

BETTS 120"—2 swivel heads, motor drive
BETTS (Consolidated) 100"—2 heads, DC, Latest type
BETTS (CONSOLIDATED) 84" 3-heads, DC Latest Type
BULLARD 24", 36", New Era Type, M.D.
BULLARD 42", Spiral Drive, latest type
BULLARD 86"—2 swivel heads, motor drive
SINCINNATI Hypro 84" 3-heads, AC Latest Type
COLBURN 72" 2 swivel heads, AC, M.D.
KING, 36" Vert., M.D.
KING 36" Motor Drive, Latest Type
KING 62" 2 swivel heads, PRT, AC, M.D.
NILES 42"—2 swivel heads; power rapid traverse
NILES 75", 2 swivel heads, PRT, AC, M.D.

DRILLS

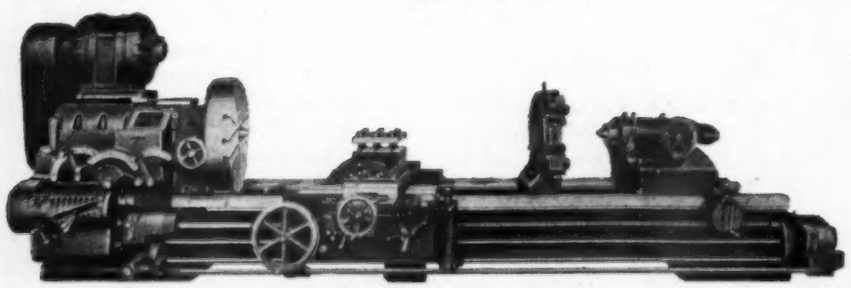
BAKER #121 Single spindle—latest type
BARNES #H3, Hydram, latest type
BARNES #210—single spindle—latest
BODINE 42-20, 42-30 automatics—M.D.
COLBURN #14, 2 spindle, heavy duty, AC, M.D.
EDLUND #1B, #2B, #2MS, M.D.
FOOTE BURT SIPP #2, #3—single spindle—latest
HENRY & WRIGHT 2 spindle
PRATT & WHITNEY No. ½Bx50" 2 spindle. Deep Hole latest type

MOREY MODERN MACHINERY

WITH —this!

DRILLS—Radial

AMERICAN 3½'9"—Maxi-Speed, Motor Drive
AMERICAN 4'11"—5'11"—5'13" AC, M.D.
AMERICAN 7' Triple-purpose, M.D.
AMERICAN 3'11", hole-wizard, Latest Type
CANEDY OTTO 3'11" New
CARLTON 4'13", 5'14", 6'15"—M.D.
CINCINNATI BICKFORD 4'13", 6'19"
DRESES 5'13", AC, M.D.
DRESES 5'15", Universal, AC, M.D.
FOSDICK 5'14", AC, M.D.
MUELLER 4½'9", AC, M.D.
NILES BEMENT POND 6'15" uni., AC, M.D.
RYERSON 4'11", AC, M.D.
WESTERN 3', 4'18", 5'18", 6'20", latest type



MODERN—LATE TYPE MACHINE

GEAR CUTTING EQUIPMENT

BARBER COLMAN Type A Hobber—latest
BARBER COLMAN Type S, #3, #12 Hobber, M.D.
BROWN & SHARPE #3H gear cutter, M.D.
FELLOWS #7, #7A type, all models, latest
FELLOWS #6, #6A type, all models, latest
GLEASON 6", 11", 18" bevel gear generator, M.D.
GLEASON #13 tester, M.D.
GLEASON 15" Quenching Press
GLEASON 24" Bevel Gear Planer
G & E #96H Gear Hobber, with differential
GOULD & EBERHARDT 12 H.S., Latest Type
GOULD & EBERHARDT 18H Hobber with in-feed, differential, M.D.
HERCULES 24" HOBBER, differential, M.D.
PRATT & WHITNEY 10" Grinder, hyd.—latest type

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GRINDERS—Cyl.—Plain & Uni.

BROWN & SHARPE #1, #2, #3, #4 Univ., motor drive—latest type
BROWN & SHARPE #5 Plain 3x12, LATEST
BROWN & SHARPE #20—plain—18x18—Latest Type
LANDIS 6x18, 8x20, plain, M.D.
LANDIS 10x24—Universal—Type "C"—Hyd.—Latest
NORTON 10x18 Plain—motor drive
NORTON 10x36" Plain Type C, Hyd., latest type
NORTON 10x72 Plain, Type C—latest type
NORTON 16x72 Universal, HYD., Multi-purpose, Latest Type

GRINDERS, Internal, Cutter and MISCELLANEOUS

BROWN & SHARPE #10 Tool & Cutter—latest
BROWN & SHARPE #13, Universal Tool, Latest Type
BRYANT No. 10—10" Chucking—internal—latest
BRYANT #5 Internal, hyd., latest type
CINCINNATI #2, #3, #4 centerless, LATEST TYPE
FITCHBURG Uni., spline shaft, hyd.
GLEASON #12 cutter grinder
HEALD 72A3 Plain internal, latest type
HEALD 72A3 Sizematic internal, latest type
HEALD 72A5 plain internal, latest type
LANDIS #1 Race-Way, Latest Type
OLIVER Tool and Cutter, Latest Type
PRATT & WHITNEY Contour Cutter—latest type
SELLERS #1 Tool—Motor Drive
SELLERS #2 Tool—Motor Drive
SELLERS #4T Uni., Tool—latest type

GRINDERS—Surface

ARTER 30" Rotary Surface—Hydraulic—latest type
ARTER Automatic Piston Ring
BLANCHARD #16A—Dial Type—motor drive
BLANCHARD #16, 20" Chuck, Motor Drive
BLANCHARD #27—42" Chuck—Latest
BROWN & SHARPE #2 M.D., Latest Type
HEALD #22, 12" Rotary, Latest Type
MATTISON 12x18x48 Hyd., Latest Type
MATTISON 14x16x36 Hyd., Latest Type
MATTISON 14x18x80 Hyd., Latest Type
NORTON 10x36 Hyd., Latest Type

LATHES—Engine & Mfg.

AMERICAN 36x25' centers—Timken Bearing—2 carriages P.R.T. Taper Attachment—Latest Type
AMERICAN 42x25' bed geared, M.D.
BRIDGEFORD 30"x28', 36"x32' bed—2 carriages, M.D.
HARDINGE TR50, Motor Drive., Latest Type
HARDINGE 9x54" bed, QCG, Cataract
HENDEY 14"x8' bed geared head
HENDEY 22"x8' bed, geared head
HENDEY—12x54 centers—latest type
HOUSTON, STANWOOD & GAMBLE 36x24' bed
LeBLOND 13"x4' bed, Timken Mfg.—latest
LOSWING 4x80", 4x84", 8x60", 8x84", Timken Bearing, Latest Type
LOSWING 8x34" Model LR Auto. Timken latest
MONARCH 22x48" Centers, Timken, latest
NILES 42"x60", double head, Motor Drive
NILES 48x10' centers—heavy duty—Timken Bearing P.R.T.—Latest Type
NILES 60x10' centers—heavy duty—Timken Bearing P.R.T.—Latest Type
NILES 60x13' centers—heavy duty—Timken Bearing P.R.T.—Latest Type
PITTSBURGH 50'x36' bed—M.D.
RIVETT #606—8"x18" Centers

LATHES—Turret

BARDONS & OLIVER #5, #7 Timken Bearing—latest type
CINCINNATI ACME #1, #5W, Timken bearing, latest type
GISHOLT #3D Simplimatics—Timken—latest
GISHOLT #1L, #2L, #3L, Universal, Timken Bearing, Latest Type
GISHOLT #4L, 9" hole—cross sliding turret—Timken Bearing—latest type
JONES & LAMSON #3, #7C Univ., latest type—Timken Bearing
LIBBY #1H-5 Timken Bearing—latest 3½" hole
MOREY 2G, #3, #4, Timken Bearing, latest
WARNER & SWASEY #2, Timken, latest
WARNER & SWASEY #4A—uni. 8" hole, timken bearing, Latest Type
WARNER & SWASEY #3, 4, 5, Universal, Timken, Latest

MILLING MACHINES—Mfg.

BRIGGS Type 2A, production, HYD, latest type
BROWN & SHARPE #900—Timken Bearing, Latest Type
BROWN & SHARPE #12 auto., Timken—latest
CINCINNATI #9-8 Vert.—Pl. Auto.—Timken Bearing—latest type—Rise & Fall
CINCINNATI 49" duplex, automatic, SPD
KEARNEY & TRECKER #12IS Auto.—Timken Bearing—latest type
MOREY #12M 2 spdle, Profiler & Milling Machine
NICHOLS Hand, M.D.—Latest Type
OHIO Auto. 10"x72" table—Timken Bearing
TAYLOR & FENN M-80, Duplex Spline, Latest Type

MILLING MACHINES—Plain

BROWN & SHARPE #2 Light Type, Timken, Latest
CINCINNATI #3 High Speed, Dial Type, Timken Bearing, latest type
CINCINNATI #4 Timken Bearing, M.D.
CINCINNATI #4S, #5, high power, M.D.
KEARNEY & TRECKER #3K—Timken—latest
KEMPSMITH #4 Maximiller—Timken—latest

MILLING MACHINES—Univ.

AMES Bench, Timken Bearing, latest type, M.D.
CINCINNATI #2, Motor Drive.
CINCINNATI #2, Dial Type, High Speed, Timken, Latest
VAN NORMAN 22L, Timken Bearing, Latest Type
HARDINGE Bench, Timken Bearing, Latest Type

MILLING MACHINES—Vertical

BROWN & SHARPE #5—motor drive
CINCINNATI #2 Dial Type—Timken—latest
CINCINNATI #3, #4 High-powered, Motor Drive
CINCINNATI #4, High Speed, Dial Type, Timken, Latest
KEARNEY & TRECKER 2H, 2K, 3H, 3K, 4H, 4K, Timken—latest

PLANERS

CINCINNATI 48x48x20', 3 heads, AC M.D.
CHANDLER 36x36x26' 4 heads AC, M.D.
CRAVEN 144"x96"x36', 4 heads, DC, M.D. Latest Type
DETRICK & HARVEY 48x48x16', 4 heads, Hyd.
DETRICK & HARVEY 48x48x12 Openside, AC, M.D.
HAMILTON 42x42x26', 4 heads, motor drive
LYND FARQUHAR 26" Openside, motor drive
NBP 54x54x12', 2 heads, box table, AC, M.D.
NILES 48x48x12'—Time Saver—3 heads, P.R.T., box table, DC, M.D.—latest type
NILES 48x48x16', 4 heads, AC, M.D.
OHIO 42x42x20'—2 heads, AC
PATCH 48x48x14', 4 heads, DC, M.D.
POND 48x48x16' 2 heads, AC, M.D.

SAWS

BRIDGEPORT #48W Abrasive
CAMPBELL #213, wet abrasive, latest
ESPEN LUCAS #138—Cold Saw, M.D.
GROB 08-20—band and filing—Latest Type
MOTCH MERRYWEATHER #3 Cold Saw—Hyd.—latest type
PEERLESS 14x14 Hack; latest type

SHAPERS

CINCINNATI 24" Crank—Motor drive
CINCINNATI 26" Travel Head—2 head Type B
COCHRANE BLY Univ. Vert. Shaper-Miller, M.D.
LAMAIRE 18' Vert. Hydraulic—latest type
MOREY 8", 10", 12", 14", Vertical, Latest type
NEWTON 15" vert. slotter, D, M.D.
MILES 18" ver. slotter, DC, M.D.
PRATT & WHITNEY 8", 10" Vertical, Motor Drive

THREAD MILLING MACHINES

HALL—Planetary, M.D.—Latest Type
HANSON & WHITNEY 4 x 9, Latest Type
MOREY SHIELDS 12x120, 12x192—latest type
PRATT & WHITNEY 4½x12, Model "C"—Latest
PRATT & WHITNEY 6x132—Motor Drive
PRATT & WHITNEY 6x20 Model "C"—Latest
SMALLEY General #20 MB, Motor Drive

MISCELLANEOUS

BARNES #420 2-spindle deep hole Drill—Hyd.—Latest Type
BAUSH Radial Tapper—latest
BILLINGS & SPENCER, 200, 400, 800 lbs. beard drop hammer, latest type
CASCADE #120 Industrial deep freeze
FERRACUTE No. DG55, Drawing, latest type
GENERAL ELECTRIC 100KW Generator
LaPOINTE #3L Broach, horiz. hyd. 15 ton cap.
LeBLOND #2 deep hole borer, latest type
MORTON 60" combination travelling head planer, milling and drilling, motor drive.
NILES 30"x50' deep hole borer, Timken—latest
PRATT & WHITNEY 2A Jig Borer, Latest Type
PRATT & WHITNEY 3-B Jig Borer—Latest type
SHUSTER #1 Wire Straightener
TREADWELL 12"—Pipe Threader—Motor Drive
WHITON 8x108 centers duplex centering, M.D.
YATES AMERICAN J-70, Woodworking Lathe, latest
YODER Multiple tube cutting machine—latest

Over 2,000 Machine Tools in Stock. Your Inquiries Are Invited

QUALITY *Machine Tools*

NOW IN STOCK

Model H-15-60 American Horizontal Hydraulic Broaching Machine, 15 ton capacity, 60" stroke, motor driven with 20 HP, 3/60/220/440 motor; equipped with broach bar support for flat broaches. New in 1942.

No. 18 Blanchard Surface Grinder, with 36" magnetic chuck, motor driven with 25 HP, 3/60/220/440 spindle motor and motor driven pump. New in 1943.

AUTOMATICS
5¼" Cleveland Model A, single spindle.
16" x 33" Fay Automatic Lathe.
⅞" Cleveland Model M, four spindle.

BORING MILL
No. 31 Lucas Horizontal, motor driven.

DRILLS
★ 4 Ft. American Hole Wizard Radial Drill, motor on arm, new in 1940.
No. D2 Colburn, single spindle.
No. 314 Baker, single spindle.
★ 21" and 28" Cincinnati-Bickford Super Service Drill.
42" Cincinnati Bickford.
★ No. 3 Bausch Multiple, 20 Spindle, No. 2 Morse Taper, Rectang. Head 20" x 40".

GEAR CUTTERS
Model A Barber-Colman Gear Hobbers.
No. 3 and No. 12 Barber-Coleman Gear Hobbers.
No. 61 Fellows Gear Shaper, m.d.
No. 715 Fellows Gear Shaper, m.d.
6" Gleason Str. Bevel Gear Generator.

GRINDERS
No. 22 Heald Rotary Surface Grinder.
No. 16-26" Blanchard Surface Grinder.
No. 72A3 Heald Sizematic Int. Grinder.
No. 72A3 Heald Gagematic Int. Grinder.
No. 3 Brown & Sharpe Univ. Grndr., m.d.
No. 13 Brown & Sharpe Universal & Tool.
10" x 24" Norton Cylindrical Grinder.
★ No. 2 Cincinnati Centerless Grinder, with hydraulic profile wheel truing attachment, through feed rest, Filmatic bearings; motor driven. New in 1942.
No. 3 Cincinnati Centerless Grinder, m.d.
No. 35 Excello Thd. Grndr., new in 1943.
No. 5VRO Hammond Buffer.

LATHES, ENGINE
12" x 30" Pratt & Whitney, g.h.
14" x 6' Sebastian, motor in base.
16" x 6' Hendey, g.h.
16" x 30" Monarch, g.h.
17" x 6' LeBlond Regal, g.h.
48" x 12' Lodge & Shipley, C.D.
IMP and LR Lo-Swing, m.d., new in 1940.
15" x 30" Lipe Carbo-matic, new in 1943.

LATHES, TURRET
No. 3A Warner & Swasey, g.h.
No. 2A Warner & Swasey, Timken Bearing, new 1942.
No. 1A Warner & Swasey, g.h., new 1943.
No. 1B Foster, g.h.
No. 4 Warner & Swasey, g.h., new in 1942.
No. 5 Warner & Swasey, Universal, g.h.
No. 3 Warner & Swasey, g.h., new in 1943.
No. 1 Bardons & Oliver, c.d.
No. 1 Brown & Sharpe, m.d.
No. 6D Potter & Johnston.
24", 36", 42" Bullard VTL, New Era.

MILLS
No. 4A Brown & Sharpe Universal, s.p.d.
No. 3 Cincinnati Univ., motor in base.
No. 2 Cincinnati Univ., motor in base.
No. 2H Milwaukee Plain double overarm, motor in base.
No. 2-MH Cincinnati Plain, m.d.
No. 2H Milwaukee Vert., motor in base.
No. 2209 Milwaukee, Table 22" x 158".
No. 3-36 Cinci. Hydromatic Duplex, m.d.
No. 6 Whitney Hand Mill.

MISCELLANEOUS
No. 17 Greenerd Arbor Press.
No. 100 Micromatic Hydrohoner.
No. 1 Standard Drop Hammer.
12' x 3/16" Bertsch Combination Punch and Shear, m.d.

PLANERS AND SHAPERS
16" Gould & Eberht. Crank Shaper, m.d.
★ 6" Pratt & Whitney Vertical Shaper.
30" x 36" x 12' Liberty Planer, 2 heads, box table.
42" x 42" x 20' Cin. Planer, D.C. Rev. m.d.

TAPPERS
No. 2BG Garvin.
Leland-Gifford Radial.

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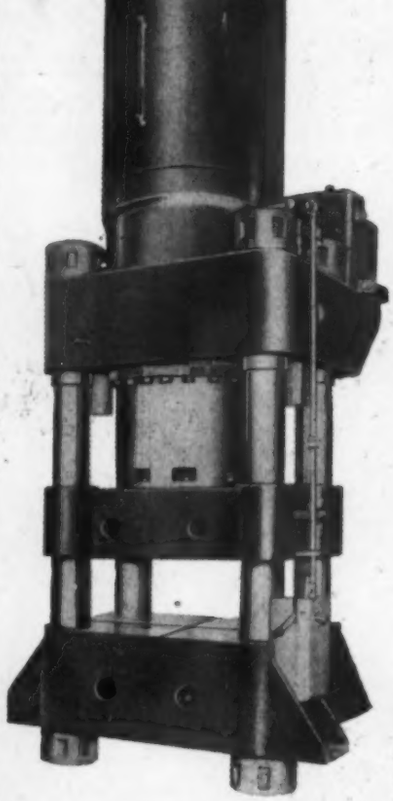

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WATSON STILLMAN
HYDRAULIC PRESS
Self Contained

Platen size 48"x42". Stroke 22".
Opening 37. Ram Diameter 35".
Driven by 50 H.P. Motor.

250 TON STRAIGHTENING PRESS, SELF CONTAINED

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MACHINE TOOLS

84" Cincinnati HYPRO Vertical Boring Mill

16" x 72" Norton Type "C" Plain Hydraulic Grinder

16" x 24" x 72" Mattison Surface Grinder

#34 Abrasive Vertical Spindle Surface Grinder

#2 Norton Tool & Cutter Grinder

#10 Brown & Sharpe Cutter & Tool Grinder

#2LP Van Norman Plain Miller

#2HS Cincinnati Vertical Miller

#3 and #4 Warner & Swasey Turret Lathes

#3 and #5 Jones & Lamson Turret Lathes

#1 Brown & Sharpe Wire Feed Screw Machines

ALL LATEST TYPE MACHINES

HAZARD BROWNELL
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Eastern OFFERS FROM STOCK

DEVOTED EXCLUSIVELY TO REBUILT MACHINERY

ENGINE LATHES

13x48" centers Pratt & Whitney, m.d. in base, taper
14"x6' American Geared Head, m.d., taper
14"x6' Hendey Geared Head, m.d., taper
14"x6' Pratt & Whitney, cone
14"x8' Pratt & Whitney cone
16"x6' Bradford, cone, taper
16"x6' Hendey Geared Head, m.d., taper
16"x6' Lodge & Shipley Selective Head, m.d.
16"x6' Type H Sebastian Geared Head, m.d. in base, latest
18"x7' Hendey Geared Head, m.d., taper
18"x8' American Geared Head, m.d., taper
18"x8' Champion, cone
18"x8' Greaves-Klusman, cone, taper
18"x8' Hendey Geared Head, m.d., taper
18"x8' Lodge & Shipley, cone
18"x8' Whitcomb-Blaisdell Geared Head
19"x10' LeBlond Geared Head, m.d.
20"x8' Cisco, cone
20"x8' Springfield Geared Head, m.d., taper
22"x8' Lodge & Shipley, cone
23"x12' LeBlond Geared Head, m.d., taper
24"x10' American M.P., cone
24"x10' American Geared Head, m.d., taper
24"x10' Hendey Geared Head, m.d.
24"x10' Lodge & Shipley Selective Head, m.d.
24"x10' Whitcomb-Blaisdell, cone
24"x12' American, cone
24"x14' Boye & Emmes, cone
24"x12' LeBlond, cone
24"x12' Reed-Prentice, cone
24"x20' Lodge & Shipley Selec. Head, m.d.
24"x20' Lodge & Shipley, cone
25"x10' LeBlond, cone
30"x12'6" Niles-Bement-Pond, m.d., taper
30"x13'6" Niles-Bement-Pond, m.d.
30"x26' Lodge & Shipley Selective Head, m.d.
36"x10' Putnam, cone
36"x12' Lodge & Shipley Selective Head, m.d.
36"x12' Wright, cone
36"x21' centers Putnam Geared Head, m.d.
36"x28'6" Niles-Bement-Pond H.D. geared head, m.d., latest
36"x30' Lodge & Shipley Selec. Head, m.d.
36"x32' centers Putnam Geared Head, m.d.
36"x36'6" Niles Heavy Duty, m.d., latest type
50"x204" centers LeBlond Heavy Duty, m.d., taper, latest type

PLAIN CYLINDRICAL GRINDERS

No. 5 size 3x18" Brown & Sharpe, m.d., latest type
No. 10 Brown & Sharpe Self-Contained, m.d.
No. 11 Brown & Sharpe Self-Contained, m.d., latest
6x18" Cincinnati Hydraulic, m.d.
6x18" Landis Self-Contained, m.d.
6x32" Fitchburg Type A, m.d.
8x36" Cincinnati Saddle Type, m.d.
10x24" Landis Self-Contained, m.d.
10x36" Cincinnati Hydraulic, m.d.
10x48" Brown & Sharpe, belt
10x48" Landis Type C Hydraulic, m.d., latest
10x72" No. 16 Brown & Sharpe, belt
10x72" Landis Self-Contained, m.d.
12x36" Landis Self-Contained, m.d.
12x48" Cincinnati Self-Contained, m.d.
12x48" Modern, belted m.d.
12x96" Landis Self-Contained, m.d.
14x18" Cincinnati Self-Contained, m.d.
14x48" Cincinati Self-Contained, m.d.
14x52" Norton, motorized
14x72" Cincinnati Self-Contained, m.d.
16x72" Landis Self-Contained, m.d.
20x120" Landis Self-Contained, m.d., with gap
26x96" Landis Self-Contained, m.d.

UNIVERSAL CYLINDRICAL GRINDERS

12x24" Cincinnati Self-Contained, filmatic spindle, m.d.
12x30" No. 2 Brown & Sharpe, belt
12x30" Landis Hydraulic, m.d., latest
12x36" Cincinnati Self-Contained, m.d.
12x36" Cincinnati, belt
12x48" Cincinanti Self-Contained, m.d.
12x48" Norton Self-Contained, m.d., latest

TOOL & CUTTER GRINDERS

No. 13 Brown & Sharpe Self-Contained, m.d., latest
Cincinnati Monoset Tool, m.d.
D6A Gallmeyer & Livingston Drill, m.d.
No. 3 Gallmeyer & Livingston Tool & Cutter, m.d.
Gleason Cutter, belt
Gisholt Universal, belt
Gould & Eberhardt Gear Cutter, belt
No. 2B Sellers Wet Drill Grinder, m.d.
No. 6G Sellers Drill, m.d.
Type 05D Sellers Bench Type Drill, m.d.
No. 2 Ohio, belt

AUTOMATICS

14" Fay, Flanders Type, m.d.
20x25" Jones & Lamson, m.d., latest type
4 spindle 3/8" Cleveland Model M, m.d.
4 spindle 2" Cleveland Model M, m.d.
4 spindle 2¼" Cleveland Model K, m.d.
2¼" Cleveland Model A, m.d.
2¼" Gridley S.S., m.d.
2½" Cleveland Model A, m.d.
4½" Cleveland Model A, m.d.
5½" Cleveland Model A, m.d.
6" Cleveland Model A, m.d.
7¾" Cleveland Model A, m.d.
No. 4D Potter & Johnston, m.d.
No. 6A Potter & Johnston, m.d.
No. 6C Potter & Johnston, m.d.

BOLT THREADING MACHINES

¾" Economy Automatic, with Lanco Head, belt
2 spindle 1¼" Landis, m.d.
3 spindle 1¼" Acme, cone

HORIZONTAL BORING MILLS

No. 0 Giddings & Lewis, m.d., 3⅛" bar
No. 45 Giddings & Lewis, m.d., 4½" bar
2½" bar Cleveland, m.d.
No. 21 Lucas, m.d., 2½" bar
4" Niles, m.d.
4" bar Detrick & Harvey Floor Type, m.d.
4" bar Landis Floor Type, m.d.
4½" bar Niles, m.d.
5½" bar Niles-Bement-Pond, m.d.
6" bar Niles-Bement-Pond, floor type, m.d.
10" bar Sellers Floor Type, m.d.
Morton 60" stroke Boring Mill and Draw Cut Traveling Head Planer, m.d.
No. 32 Giddings & Lewis, m.d., 3⅛" bar
No. 300 Giddings & Lewis Floor Type, m.d.

SAWS

7½ H.P. Cincinnati Elec. Tool Co. type JCAW Abrasive Cut-off Machine
Wagner Cold Saw, 22" blade
No. 138 Espen-Lucas Cold Saw, m.d.
No. 3 and 8 Nutter & Barnes Cold Saws
No. 5 and 6 Cochran-Bly Cold Saws

SHEET METAL MACHINERY

No. 4 Hilles & Jones Straightening Rolls, m.d., cap. 1" plate 8' long
Southwark Rotary Metal Cutter, 36" throat, ⅜" cap.
8'x¼" Niles Hand Flanging Machine
No. 2 Campbell Nibbler, m.d.

TAPPERS

No. 1 and 2 Warner & Swasey Tapping Machines, m.d., latest type
6 spindle ½" Acme Semi-Automatic Nut Tapper, m.d., latest
½" Rickert & Shaffer Vertical, belt
No. 5 Webster & Perks 5 spindle Vertical Nut, belt

SLOTTERS

10" Newton, cone
12" Bement, m.d.
15" Canada, m.d.
48" Niles-Bement-Pond Geared, m.d.

MISCELLANEOUS

Gisholt Precision Balancing, m.d.
No. 2 Cochran-Bly Filing
No. 12M Morey 2 spindle Profiler, m.d., latest
No. 11S Cochran-Bly Saw Sharpener, m.d.
Wagner Saw Sharpener, belt

MORE THAN 2,000 MACHINES IN STOCK
LET US QUOTE ON YOUR REQUIREMENTS.

THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS
EMCO

LATE MODEL MACHINE TOOLS AVAILABLE

BORING MILLS

#25C DEFIANCE Table Type, M.D.
3½" GILBERT Table Type, M.D.
#360F GIDDINGS & LEWIS Floor Type, M.D.
#560F GIDDINGS & LEWIS Floor Type, M.D.
24" BULLARD VTL., M.D.
36" BULLARD VTL., M.D.

DRILLING MACHINES

7'17" AMERICAN "HOLE WIZARD", M.D.
4'13" CINCINNATI-BICKFORD RADIAL, M.D. through Gear Box
2, 4, & 6 spindle AVEY, ALLEN and LELAND-GIFFORD DRILLS, M.D.

GEAR MACHINERY

#64A FELLOWS GEAR SHAPER, M.D.
#36BM GOULD & EBERHARDT 3-spindle GEAR ROUGHERS, M.D.
GLEASON BEVEL GEAR GRINDER
#12B GLEASON BEVEL GEAR GENERATORS
#17 GLEASON Hypoid GEAR CUTTER
#7A type FELLOWS GEAR SHAPER
9" P&W HYD. GEAR GRINDER

GRINDERS

#5 B & S PLAIN, M.D.
12"x48" NORTON MULTIPURPOSE UNIV., M.D.
#70-A HEALD INTERNAL, M.D.
#72-A3 HEALD INTERNAL, M.D.
#74 HEALD INTERNAL, M.D.
#81 HEALD "GAGE-MATIC", M.D.
#81 HEALD "SIZE-MATIC", M.D.
4"x12" LANDIS "H" Pl. Cyl., M.D.
10"x18" NORTON Hyd. Cyl. Grinder
14"x168" NORTON TYPE "C" Cyl. M.D.

GRINDERS (Continued)

12" ARTER ROTARY SURFACE GRINDER, M.D.
#11 BLANCHARD ROTARY SURFACE M.D. 16" & 20" chucks
#49 EXCELLO TOOL GRINDER, M.D.
#4T SELLERS TOOL GRINDER, M.D.
6"x48" THOMPSON BROACH GRINDER, M.D.
20" FITCHBURG SPLINE GRINDER, M.D.
#5A BRYANT CHUCKING GRINDER, M.D.
#5 B & S PLAIN GRINDER
12"x48" NORTON "MULTI-PURPOSE" UNIV.

LATHES

18"x72" MONARCH 6-speed GEAR HEAD, M.D.
27"x20' bed LEHMAN LATHE, two carriages with T.A., M.D.
42"x132" centers AMERICAN "SUPER PRODUCTIVE", M.D.
50"x17' centers LEBLOND "BIG SWING", M.D.
SUNDSTRAND Automatic Lathe, M.D.
12"x21" FAY AUTOMATIC LATHES, M.D.

MILLING MACHINES

#2MS CINCINNATI VERT. MILLER
#3MS CINCINNATI VERT. MILLER
#3K K & T VERT., M.D.
#4 CINCINNATI HI-POWER VERT, M.D.
#5H K&T PL. MILLER, M.D.
U.S. MULTI-MILLERS, M.D.
#1H-12 K & T MFG. MILLER
12"x18" MILWAUKEE SIMPLEX MILLER

MILLING MACHINES (Continued)

12"x24" MILWAUKEE SIMPLEX MILLER
#10 BROWN & SHARPE AUTO. MILLER
#12 BROWN & SHARPE AUTO. MILLER
#2-18 CINCINNATI PL. AUTO. MILLER
#2-24 CINCINNATI PL. AUTO. MILLER
#1224 MILWAUKEE DUPLEX MILLER
#5-60 CINCINNATI DUPLEX HYDR. MILLER
4"x9" HANSON-WHITNEY THREAD MILLER
#4 CINCINNATI "HI-POWER" VERT.
#2HL K & T PLAIN HOR.
#3H K & T VERT.

TURRET LATHES

#0 B&S WIRE FEED SCREW MACHINES, M.D.
#4 W&S UNIV. TURRET LATHES, M.D.
#5 J & L UNIV. TURRET LATHES, M.D.
#1A W & S Univ. Turret Lathes, M.D.
#4 MIDLAND UNIV. TURRET LATHES, M.D.
6"x6¾" GOSS & DELEEUW AUTO CHUCKING MACHINES, M.D.
#2FU FOSTER "FASTERMATICS", M.D.

MISCELLANEOUS

#3120 NIAGARA POWER SHEAR, 10' 10 gauge cap.
#4½ BLISS SS 3-crank D.A. Press, M.D.
New HUB 15 ton OBI Press, M.D.
New U.S. OBI Press, 12 ton, M.D.
#2420 KELLER AUTO. Engraver
#36-F NORTON Hydro-Lap
25-ton Oil Gear Straightening Press
Type "T" AMERICAN 3-way Vert. Surface Broach, M.D.

WIGGLESWORTH MACHINERY CO.

203 BENT STREET • CAMBRIDGE, MASS.

NEW

REAMER SETS

¼" to 1¼" by 32nds Hand Reamers. 33 Reamers in Box. Price $30.00 per set net.

Morse Hand Finishing Reamers. #1 to #5 Morse. 5 Reamers in Box. Price $7.00 per set net.

VICTOR MACHINERY EXCHANGE, Inc.

251 CENTRE STREET
NEW YORK 13, N. Y.
CANAL 6-5575

THREAD GAGES — PLUG AND RING

Slightly used, NF-2 & 3, ¼ to 1", 6, 8, 10 M.S. Also 1 to 4" N.S.
LESS 75 Percent Discount.

ADJUSTABLE SNAP GAGES. ALL SIZES. ½ to 8".
LESS 75 Percent Discount.

DE WITT TOOL COMPANY

173 GRAND STREET NEW YORK 13, N. Y.
Send For Our Bargain Circular

UNUSUAL VALUES

Blueprint machines, printer-washer-dryer
Rivett Ball Brg. Precision Screw-Machine
Simmons No. 1A Micro Milling Machine
Drills, high speed single & multiple spindle
Drills, 21" Royersford Bk Grd. Pr. Feed, New
Drills, sensitive, 2 and 4 Spindles
Drill, #25 Foot-Burt motor driven
Drills—New—16" Royal Motor driven (10)
Gear cutter, Brown & Sharpe #3—26
Gear Cutter, Gould & Eberhardt 42"
Grinder, Webster and Perks #1-¾ motor drive
22" Buffalo Pr. Fd. Motor Drive, New
16"x6' Hendey Lathe, Quick Change Gear
Magic Chucks #1-2 & 3 and Collets
Pipe Machine, 3" Oster motor drive
Planer, 24"x24"x8' Pease motor drive
Punch & Shear, two ½" & ⅝" capacity
Shaper, 24" Gould & Eberhardt
Turret Lathe, 3" Acme & Warner & Swasey
Welders—Arc & Spot in Stock—New

Outfit: about 27 fine machine tools, drills, lathe, and 5 milling machines, plain and Uni. Tell us definitely what you want as our list is incomplete and only partial.

The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

THE OSBORNE & SEXTON MACHINERY CO.
COLUMBUS, OHIO

McDONALD

USED MACHINERY

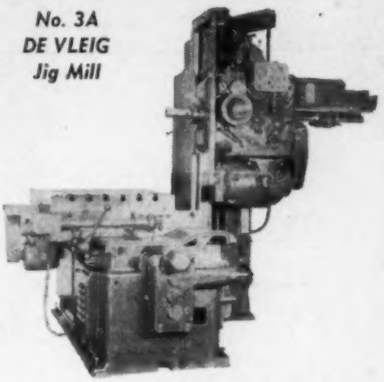
G & E 24" Cin. 32" Shapers
Cleveland O.S. Planer 36"x8', 2 hds.
Abrasive #3-B M.D. Horiz. Surf. Grinder
Cincinnati D. H. Planer 36"x36"x10', 2 hds.
Barnes geared Camelback Drill Press, 4 sp.
Bullard Vert. Turret Lathes, 24" & 36" S. Head
Defiance 3" Horiz. Boring Mill & Univ. #3-A
L & S 18x12' & 20'x10' 20"x8' Grd. Hd. M.D. & 28"x12' Lathes
American 24'x12 grd. hd. lathe, m.d. q.c.g.
Amer. 4-ton vert. Hydr. Broach
Blanchard Vert. Surf. Grinder, 26 rd. chuck.
Cincinnati #2 Centerless Grinder.
Colburn 60" & 72" Vert. Boring Mills
Cincinnati 1-M grd. hd., Univ. tool room Miller.
Cincinnati No. 5 H.P. grd. hd. S.P.D. Pl. Miller.
Milwaukee No. 3-B Vert. Miller grd. hd., m.d.
Cin-Bick 3' Super Serv. Radial
Gisholt 3R Grd. Hd. M.D. Turret Lathe
W.&S. No. 2A grd. hd. Univ. Turret Lathe, S.P.D.
Foster No. 2F Fostermatic grd. hd. Turret Lathe, M.D.

MONA MEMBER

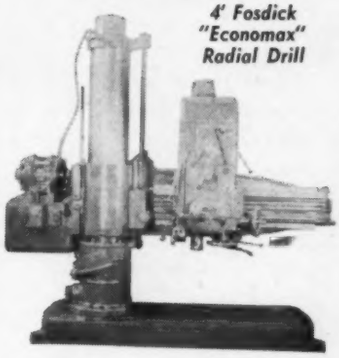
McDONALD MACHINERY CO.
1531-35 N. B'way., St. Louis 6, Mo.

GET YOUR COPY NOW!

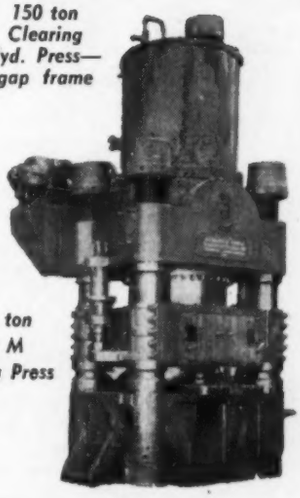
No. 3A
DE VLEIG
Jig Mill



4' Fosdick
"Economax"
Radial Drill



150 ton
Clearing
Hyd. Press—
gap frame



2000 ton
H P M
Hobbing Press

JUST RECEIVED—(not listed in our Catalog)

Late type LeBlond Rapid Production Lathes & Warner and Swasey, Jones and Lamson, Gisholt Turret Lathes, Nos. 3-4-5 & Barnes Drills Nos. 262-210 and Leland-Gifford Drills, Nos. 2LMS, 1-2-3-4 spindles & Cincinnati Mills, No. 0-8, Vertical and Plain & Barber-Colman type A Gear Hobber.

Featured in Catalog 47A are: Fastermatics, turret and platen; Bryant Internal Grinders; Jones and Lamson Thread Grinders, Milwaukee Simplex Mills; Heald Internal Grinders and Rotary Surface Grinders; Bullard and N.B.P. Boring Mills, Jig Borers, Production and Tool Room Machine Tools.

Write for your copy now! Just the thing to have on hand when planning your next job . . . it's FREE.

EMERMAN MACHINERY CORP.

875 W. 120TH STREET CHICAGO 43, ILLINOIS

NEW—SPOT DELIVERY

POWER PRESSES

Make	Tons	Stroke	Type
(5) V & O #0	5	2"	OBI-Dial Feeds
(2) Federal #0	6½	1¾"	OBI-Dial Feeds, geared mot
(8) V & O #2	17-25	4"	OBI-Dial Feeds, geared mot
(11) Wat-Farrel	25	3" up-3" down or single action 3"	C Frame-Double Action, Dial Feeds (or single action)

SAWS —Kalamazoo Metal Cutting Band Saws, Horizontal
SHEARS—(Foot) Frederick complete 36" x 18 G cap.
(2) (Power) Pexto 6' x 16 G Gap
BRAKES—Press type, all steel, Lynn Hydraulic, motor self contained, 56" x 14 G (also used for punching)
ROLLS —Initial type, Frederick, 36" x 22 G, Hand.

USED POWER PRESSES

Make	Tons	Stroke	Die Space	Shut	Type
(6) Wat-Farrel	7½	1½"	8½" x 12"	6"	SS, Single Action, C Gap frame
(3) Bliss No. 18	10	1½"	8½" x 14½"	7"	OBI Geared or plain
Max Ames	15	2"	9" x 18½"	6"	OBI Roller Feed 3" x 2"
(5) Bliss #58	20	5"	7½" x 15"	10"	SS, gap, single action
(4) Ferracute C22 Duplex	20	5½"	12½" x 18"	12"	Gap, single action, SS, Duplex, Hopper Feed
(2) Bliss #62A	30	8"	14" x 24"	17"	SS, Gap, single action Hopper Feed
(2) Federal #3	30	8"	14" x 24"	17"	SS, Gap, single action, Hopper Feed
Bliss #68C	35	1-2½"	21" x 10½"	7"	Arch, DA
(3) Mystic No. 5A	40	6"	14" x 17"	14"	Embossing & Moulding for Plastics
Torrington	40	1-2"	23" x 16"	6½"	SS-DA
Bliss #1B	43	3-6"	14" x 25"	8½"	SS-DA, Gap
Bliss #02	45	4"	22" x 47"	9"	SS, Gap, dble crank, Single Action
(2) Bliss #52	45	2"	14" x 15"	8½"	SS
Wat-Farrel	50	Eyelet			6 Plunger
Bliss #4 Header	56	8" & 6"	1½" x 2⅜"	—	Horizontal Double Header Single Die
Toledo #54	60	3"	18" x 18"	12"	Trimmers-Shear
Bliss #57	75	2"	18" x 18"	11"	SS-Trimming
Stiles Parker	75	2½"	24" x 32"	12"	Open Back Inclinable
Bethlehm	75-100	2½"	60" x 60"	—	SS, Dble crank, single action
Cleveland #10S	90	8"	22" x 22"	38"	Single Action, geared
Toledo #59½S	500	8"	31" x 31"	29"	SS-DA, Twin Drive
Lake Erie Hydraulic	1320	36"	80" x 60"		Pump and Motor 1943
Lake Erie Hydraulic	2500	36"	133" x 120"	42"	Pump and Motor 1944

BRAKES—(Power) with motors.
D & K 5' x 10 G Box & Pan 13 fingers
D & K 8' x 16 G apron
Ohl 10' x 10 G (Press)
New—Lynn 56" x 14 G Press Hydraulic, motor, self-contained (also used for gang punching)

SHEARS—(Power) with motors
Niagara 5' x 14G (gap)
(2) Pexto 6' x 16 G (gap)
Bliss 42" x 14 G
CRANKSHAFT GRINDER—Landis 16" x 48"
ROLLS—Bending, Bertsch, 16' x ½" cap, Initial type.
(7) TURRETS—Denver 6" motor in base, air chuck, late.

KINGS COUNTY MACHINERY EXCHANGE
394 ATLANTIC AVENUE, BROOKLYN 2, N. Y.
Phones: TRiangle 5-5237, 5-5212, 5-5213
WIRE — PHONE — WRITE
MDNA MEMBER

POWER PRESSES

Bliss #304, 56 tons, 8" str., 18x18"
Bliss #6, 125 tons, sgl. & dbl. act. 24x30"
Bliss #7, 180 tons, sgl. & dbl. act. 24x36"
Bliss #7, 88 tons, 4" to 8" str., Horning
Cleve #10S, 90 tons, 8" str. 22x22"
Bliss #87½, 200 tons, 16-30" str., 28x28"
Bliss #88, 250 tons, 10" to 30" str., 29x29"
Clearing F1250—22, 250 tons, 22" str., 32x42"
Toledo 59½S, 500 tons, 8" str. 31x31"
Bliss 26A, 800 tons, 5" str. Knuckle
Clear. K800, 800 tons, 6" str. 42x42"
Vers. 40K, 1000 tons, 4" str. 36x36"
Natl. Maxi. #6, 2000 tons, 12" str.
Fed. #0—7 tons, dial feed (new)
Bliss #58, 18 tons, 5" str. 12½x13½"
Fed. #3, 30 tons, 8" str. 14x24"
Ferr. C22—Duplex, 15 tons, 5" str. 18x24"

Lathe, Simmons 48"x20' c-c
Lathe, Pittsburgh, 50"x14' c-c
Planer Cinc., 60"x60"x14', H.D., dbl. housing
Boring Mill, Betts 96", 4 Heads
Ceco Stamps 24"x30", 36"x48", 48"x48", 48"x66", 60"x156"
Rotary Shear ¾" Model #50A Quickwork
Pneumatic Drop Hammer, 36"x48", 3000 lb. Head
5" Acme Upsetter (1944)
300,000 lb. Drawbench—20,000 lb. Drawbench
HYDRAULIC PRESSES 75 tons to 5000 tons

GOTHAM MACHINERY CORPORATION
(INDUSTRIAL ENGINEERING SERVICE)
1775 BROADWAY PLaza 9-4643 NEW YORK 19, N. Y.

LATHE
16"x54" Reed Prentice Model AA 16 speed—Geared Head—Latest type and design—1941 Mfg.—Excellent

DRILLS
3'11" Carlton Radial—1942
4-spdle Sipp—T&L
4-spdle Allen T&L
Natco D5 Multiple
16" C-D-Floor—MD—NEW
16" C-D-Bench—MD—NEW

GRINDERS
14x14x48 #5 Abrasive—Surface—MD
#2 Cinc. Centerless—Filmatic—1942
#25 Heald—12" Rotary Surface

LATHES AND TURRETS
24"x10' Blaisdell—LCG—CD
#2 W & S Turret
18"x8' Flather—QCG
16"x6' Sebastian—NEW
10" Logans—NEW—all models

MILLING MACHINES
#2 Cinc. Plain H.S. Dial—1942
#2K K & T "Milw" Plain—1942
#4 Cinc.—Plain—Dial type—1942
#2G Kempsmith Universal—1943
#2MH Cinc. Plain—1942
#22L Van Norman—Universal—1941
#2 Cinc.—Universal—4 speed drive—M.D.
Miller & Crown Hand—MD

SHAPERS
16" Gemco—NEW
7" Logan—NEW
16" Ohio—CD

MISCELLANEOUS
#1A Gorton Etcher & Engraver
Gear Hobber—Pfauter #0—14" Univ.
Metal Saw—#4C Cochran-Bly
36" Pexto Power Squaring
Band Saw 8x16 Kalamazoo—NEW
EL—Die Filer Harvery "Butterfly"
Saw 6x6 Racine—Power

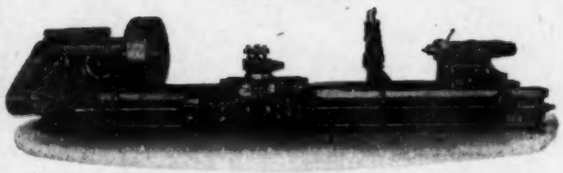
UNITED MACHINERY & TOOL CORPORATION
35 Hermon St., Worcester 8, Mass.

SHEET METAL MACHINERY
NEW and USED—Hand and Power Brakes, Shears, Forming Rolls, Folders, Punches, Rotary Machines, Stakes, Spot and Arc Welders.
MDNA MEMBER
B. D. BROOKS, INC.
361 Atlantic Ave., Boston, Mass.

1—Practically new 500-ton Watson-Stillman Semi-Automatic Molding Press with self-contained pumping unit, stroke 24", die space 40"x32".
MDNA MEMBER
D. E. DONY MACHINERY CO.
47 Laureiton Road, Rochester 9, N. Y.

SIMMONS CURRENT ATTRACTIONS

LATHES



48"x40' SIMMONS Heavy Geared Head Engine Lathe, AC or DC (new 1942)

30"x18' AMERICAN 12 Speed, G.H.
30"x23' AMERICAN 12-speed, G.H.
36"x32' NILES, "Timesaver".
42"x34' LEBLOND late type.
48"x40' SIMMONS, Geared head.
60"x30' NILES Heavy Duty Geared Head, M.D. (Built 1942).
60"x31' (20' centers) NILES, 16-speed G.H. Lathe (New 1942).
90" PUTNAM Driving Wheel Lathe with journal truing and Double Quartering.
No. 2-H LIBBY, Full Universal Cross Feeding Turret, Taper Attachment, M.D.
3-AL GISHOLT, Hardened Ways.

Write today for Complete Current Stock List of Simmons Engineered Rebuilt Machine Tools.

BORING MILLS

9" Bar BETTS Horizontal floor type, 50" face plate 6'—vertical travel, modern, 4-motors.
3" Bar Universal TRI-WAY Horizontal, P.R.T.
3¼" Bar No. 32 GIDDINGS-LEWIS
4½" Bar N.B.P. Table type.
24" New Era, BULLARD.
54", 60" and 72" COLBURNS, two heads.
72" KING, Two Swivel Heads.
12' BETTS Heavy Double Drive.
14-20' N-B-P Extension type boring 2 swivel heads, all geared feeds.
16' N-B-P 2 swivel heads.

12' BETTS Extra heavy Double Drive, 30 H.P., 230 volt D.C., 2 swivel heads.

SIMMONS MACHINE TOOL CORPORATION

MAIN OFFICE & PLANT: 1759 NO. B'WAY, ALBANY 1, N. Y. N. Y. OFFICE: 50 E. 42nd ST., N. Y. 17, N. Y.

GANEY offers

The following equipment at "sell-quick" prices. *The partial list below is another reason why you should make it a rule to call GANEY whenever you are buying or selling machine tools.*

AUTOMATICS

2 Model B Cleveland, ⅞" capacity, Motorized.
1" Foote Burt Single Spindle, 1941, M.D.

BORING MILLS

24" Bullard Vertical, M.D.
10'-16' Niles Bement Pond, Vertical, M.D.

DRILLS

3' Cincinnati-Bickford Radial, M.D.
4' Hammond Type G, Radial, M.D.
6' FOSDICK RADIAL, M.D.
1, 2, 3 Spindle Sensitive, M.D.

GRINDERS

No. 70 Heald Internal, arr. M.D.
NO. 81 HEALD INTERNAL, M.D.
12"x30" Brown & Sharpe Universal Grinder, B.D.
14"x36" Pratt & Whitney Surface, arr. M.D.
No. 16 Blanchard Surface, 1-27" & 1-30" chuck, M.D.
No. 2 Cincinnati Centerless, 1944.
No. 3 Diamond Surface, 10"x48" Chuck, arr. M.D.
No. 4 T Sellers Cutter, M.D.
No. 3 Ohio Tool & Cutter, M.D.
No. 1C Wardwell Automatic Saw, M.D.
4"x10" Ohio Superfinishing Machine.

LATHES

14"x6' Lodge & Shipley Patent Head, M.D.
20"x12' Schumacher & Boye, Cone Head.
30"x14' Niles Engine, arr. M.D.
NO. 5 JONES & LAMSON UNIVERSAL RAM TYPE TURRET, M.D.
No. 2 Simmons Micro Speed Turret, M.D.
No. 1B Foster Turret, Power Feeds, S.P.D.

MILLS

NO. 2A BROWN & SHARPE UNIVERSAL, MOTOR IN BASE.
NO. 2M CINCINNATI PLAIN, RECT. OVERARM, MOTOR IN BASE, VERTICAL HEAD.
No. 2B Hendey Plain Conehead, with Bridgeport Head.
No. 3B Kearney & Trecker Plain, Geared Head, S.P.D.
No. 2 Brown & Sharpe Vertical, Geared Head, S.P.D.
NO. 4 CINCINNATI VERTICAL, HIGH SPEED, M.D.
NO. 35 SUNDSTRAND, FLUIDSCREW OPENSIDE RIGIDMILL, M.D.
TYPE P OHIO PRODUCTION, NEW 1941, M.D.

PRESSES—FOLDERS—BEADERS

NO. 46 BLISS, S.S. SINGLE CRANK, BED 24"x24", GEARED.
No. 61 V & O S.S. Single Crank, Bed 15"x15".
50 Ton Bliss High Speed, Bed 16"x24".
NO. 96 NIAGARA HEAVY PRODUCTION FOLDER 4'x10 GA.
No. 180 Niagara Rotary Beader, with circle attachment, M.D.

SHAPERS—PLANERS

24" Springfield Shaper Vise, B.G.-Turner Uni. Drive.
36"x36"x10' Cincinnati Planer, 2 hds.
No. 7175A Fellows Gear Shaper.
No. 64A Fellows Gear Shaper.

HARD TO FIND ITEMS

350 H.P. Gen. Electric 25 cycle Motor.
125 H.P. & 75 H.P. D.C. Motors.
100 C.F.M. Ingersoll Air Compressor.
Penn Automatic Riveters.
10 KW 25 Cycle Spot Welders.
Lot of Conveyor Equipment—Reeves Drives & Speed Reducers.
S-13C Bostitch Metal Stitcher.
Kane & Roach Cold Roll Forming Machines.
300 lb. Acetylene Airco Generator with water seals.
Talhurst Chip Wringer.
1,000,000 B.T.U. Floor Type Gas Heater.
Kemp Series S, Model No. 7 Industrial Carburetor.
Model B Simplicity Vibrating Shakeout Machine.
Drying Systems, Inc. Core Drying Ovens.
AUTOCLAVE EQUIPMENT FOR IMPREGNATING ALUMINUM CASTINGS.

OTHER IMPORTANT GANEY SERVICES

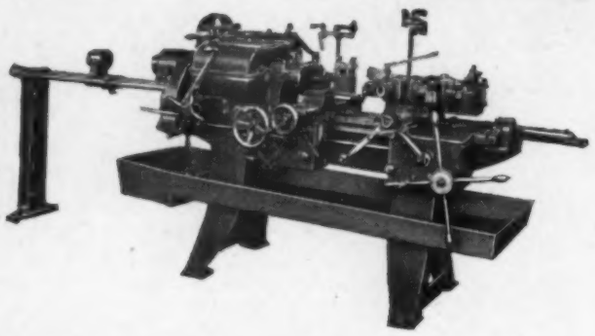
BUYING AND SELLING—through our rapid turnover of machine tools, we are now in an excellent position to talk to you.

APPRAISING—24 years of practical experience provides the Ganey organization with full knowledge of trends and values in the machine tool field.

CONSULTING—Machine tool problems are arising daily and your plant cannot be an exception. We will be glad to discuss any machine tool problems with you.

WAR ASSETS ADMINISTRATION APPROVED DEALER (N. Y. No. 7)—By our continuous contacts with this government agency we are kept posted on all available equipment.

GANEY
MACHINERY CO., INC.
1801 ELMWOOD AVENUE
BUFFALO 7, N. Y.



Foster No. 1B Universal Turret Lathe

Swing over bed 15½". Swing over carriage slides 14". Auto. chuck cap. rd. 2"; sq. 1⅜"; hex. 1⅜". Dia. hole thru spindle 2⅛". Spindle speeds 20-480 R. P. M. Dia. of turret across flats 11"-size holes 2½". Center of holes to top of turret 2¼".

$750

Botwinik Machine Tools

Immense Stocks . . . Quick Delivery

DRILLS

Avey & Allen 3, 4, 5, & 6 Sp.
Cincinnati-Bickford 3', 4', 5', & 6' Radials

GRINDERS

Morris 3'
Morspeed Radial 1 year old
Abrasive Nos. 33 & 34; No. 3B
Gardner & Besly 53" Horizontal Disc
Norton 6"x18" Hyd. Surface
Norton 6"x10"x36" Surface
Norton 15"x15"x72" Surface
Norton 6x32, 10x24, 10x30 Plain
B. & S. Nos. 10, 11, Plain
Bryant Nos. 3B, 5, 6, 12 Internal
Heald No. 70-A, Internal
Landis 12"x32"
Cincinnati No. 1½ Tool & Cutter
LeBlond No. 2 Tool & Cutter
Norton No. 2 Tool & Cutter
Cincinnati No. 2 & No. 3 Centerless
Cincinnati No. 3 Centerless Lapper
Fitchburg 36" Spline Grinder
Blanchard No. 16—30"
Heald No. 25—A Rotary Surface
P. & W. 14" Vert. B.B.
P. & W. 22" Vertical, B.B.

LATHES

Hendey 14"x6' Y.H.
American 16"x6'—G.H.
Lodge & Shipley 20"x8' G.H.

MILLERS

K & T #2HL Plain
Milw. No. 2B & 3B Double Overarm
B. & S. No. 0Y Production
Cin. No. 2MH Plain; Nos. 3, 4 Vert.
Becker Model C, Vertical
B. & S. No. 3B & 5B Plain
Rise-Barton 4" Spline
P. & W. 8", 10" & 12" Automatic
Cincinnati 18" & 24" Production
Sundstrand No. 1-18 and No. 2 Electromil.
P. & W. 6x14 & 8x72 Thread
Lees-Bradner 6"x36" Thread
Van Norman Duplex Nos. 0-2-20
Van Norman #2 Plain
Cincinnati #5 M.D. Plain
K&T #2K, 3K Vertical

PLANERS

Cincinnati—48"x48"x20' 3 Head
Powell 48"x48"x12', 4 Head

SCREW MACHINES

B. & S. No. 00, 0, 2 Automatics
B. & S. No. 1 & 2 Hand Screw
Potter & Johnson No. 6-C Chuckers
Cleveland 1⅛" Model AA
W. & S. Nos. 1, 2, 2A, 3A Universal
Foster No. 7 and No. 1B
Cone 1¼" 4 Spindle
Cleveland 3½" Model A, Latest Type
Cone 3½"—4 Spindle
Cleveland 6¾" Model A
Cleveland 7¾" & 8" Model A
Gridley ⅞", 1¼", 1¾", & 2⅝", Model G; 3¼" & 4¼"

MISCELLANEOUS

Borematic—Heald No. 47-A
Boring Mill—Gisholt 30"
Boring Mill—Bullard 36" & 42" New Era
Boring Mill—Bullard 100" 2 Head.
Cutoff Machine—Abrasive No. 213
Fay Automatic
Fellows Gear Shaper No. 7
Hammers—Bradley
Rack Shaper—Fellows 4"x72"

Write for Illustrated Folder of other values in machine Tools

373 WELTON ST., NEW HAVEN 9, CONN.

EXPORT DEP'T: 44 G WHITEHALL ST., NEW YORK

Botwinik Bros.
INCORPORATED

PUNCH PRESSES

IMMEDIATE DELIVERY FROM STOCK

No. 4½ BLISS, 80-100 Ton Capacity straight side punch press, late model with scrap cutters, double roll feeds, bolster. 10 H.P. motors and controls, forced feed lubrication. 21x27 bolster 4½" stroke. In both Single and Double Action Models. Like new.

No. 6 BLISS 90-125 Ton Capacity, straight side Punch Presses, late model. With scrap cutters, double roll feeds, bolster, 15 Hp motors and controls, forced feed lubrication. 25x30" bolster, 5½" stroke. In both Single and Double action models. Like new.

35 ton Bliss Gap Frame Punch Presses, 4-8" stroke, latest design.

1—#87 BLISS Press, 175 Ton cap. 32" stroke, late model.

#666 Toledo, Knuckle Joint Press. 1000 ton cap. 37x21 bolster, 5" stroke, very good condition, all electrical equipment.

SPOT WELDERS IMMEDIATE DELIVERY 5-300 KVA, Brand new. 5 year guarantee.

PAUL'S MOTOR AND MACHINERY SUPPLY CO

MDNA MEMBER

Detroit 8, Mich.
6111 Vermont Ave.
TYLER 76300

TOP PERFORMANCE AT LOW PRICES

NEW OBI PRESSES 35 TO 70 TON—GOOD DELIVERY

#1—P R & K OBI Press (2)

#39 Bliss Horning Press

6 ton Fox "Superflex" Press

10"x36" NORTON PLAIN HYDRAULIC GRINDER, 1941, 5" face wheel

#1B Milwaukee Univ. Mill, M.D.

11"x5' Sebastian Gold Seal Lathe GH, T.A., Motor in base

#2 Baker Keyseater, M.D.

All these are but a partial listing. Your inquiries for any Metal Working Equipment are welcomed.

OTT MACHINERY SALES, INC.
542 Second Ave., Detroit 26, Mich.
CAdillac 3103

Each "Searchlight" advertisement

represents a current WANT of an individual or concern, in the metal working industry served by this publication with some element of profit in each, for both buyer and seller.

Some are employment opportunities; others offer solutions to pressing production problems; still others offer good used equipment.

"Searchlight" advertisements are constantly changing. New opportunities find their way into this great WANT medium, each issue. Regular reading of the "Searchlight" pages can be as important to you as reading the editorial pages. One is news of the industry, the other — NEWS OF OPPORTUNITIES currently offered in the industry.

for

EVERY BUSINESS WANT

Think "SEARCHLIGHT" First

Belt Cutters, 1"-1¼"-2"-2¼"-4" Acme, Landis.
Boring Mills, 24"-36"-42"-52"-72"-96".
Drills, Radial 6' Cin.-Bick. 5' Carlton.
Lathe, Turret 3-A W. & S., S. P. D.
Millers, Plain No. 3 K & T. No. 4 Cin.
Planer 36"x36"x12' Powell 4 Hds.
Profiler, #13 P. & W., B.D.
Shapers, 16"-20"-24"-36".
Shaper, 26" Morton Draw Cut.

West Penn Machinery Company
1210 House Bldg. Pittsburgh, Pa.

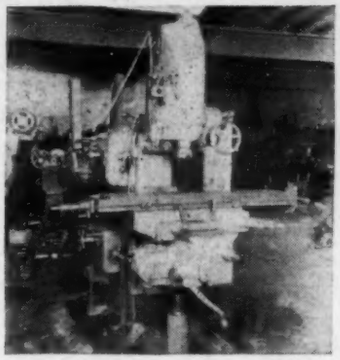
POWER PRESSES

BLISS, TOLEDO, V & O, ETC.
REBUILT — GUARANTEED

MDNA MEMBER

JOSEPH HYMAN & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

AUTOMATIC SCREW MACHINES

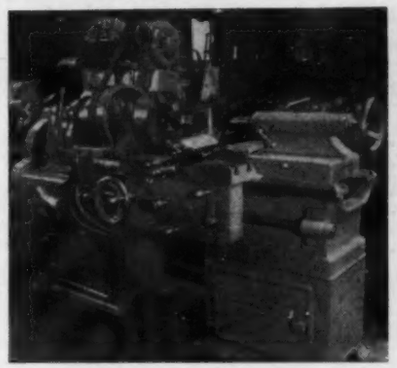


Cincinnati #2 vertical miller $1000.

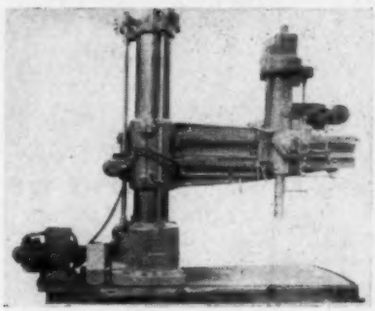
Acme Gridley RB6, 2⅝", RA8, 1⅝", RA6, 1⅝", RA6, 1¼", RA6, 1", RA6, 9/16".
New Britain Gridley Models 60 and 61, 2¼", 1⅝", 1", 23A Chucker.
Conomatic 6 spindle 2⅝", 4 spindle 6", 4 spindle 2⅝", Cut Off.
Cleveland single spindle 5¾".
Goss & DeLeeuw 5 spindle 8".

Other Late Type Machines

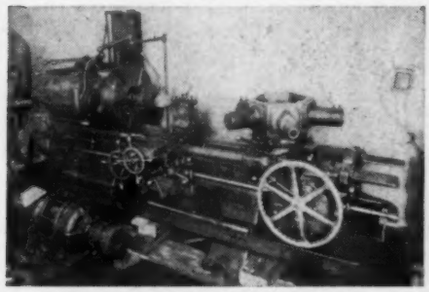
Farnham Forming Roll (new) cap. 1515 EXX ⅛"x15' $7237.
36/72 Cincinnati Horizontal Hydrotel Milling Machine 1942 now $6218. cost new $27,000.
Warner Swasey & Gisholt 1942 #3 & #4 Turret Lathes with bar att.
Bryant internal grinder 24x36 (1942) Lees Bradner
Thread Miller 12x36 (1942) Barber Colman #3 Precision gear hobbers (1942) Racine 12" hydraulic cut off saw (1942) Bullard Multaumatic 6 spindle 12" $3000 (REBUILT) Large Lathes.



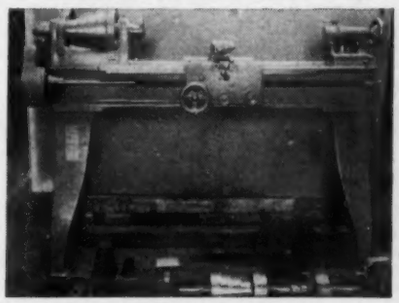
Ryerson 18"x30" C.C. motor, gear box, $800.



Cincinnati Bickford 6' radial drill D.C. motor drive. $1350.



Warner & Swasey 3A Turret lathe with motor. $1400. serial 322787



10 Reed 12"x5' and 6' lathes, hollow spindle, $250. and $300. each.

GENERAL MACHINERY AND EQUIPMENT CO.

180 S. 15th STREET
HARRISBURG, PA.

Warehouses in Lancaster and Philadelphia, Pa.

LIKE NEW

#2 Reid Auto. Surf. Grinder
10"x20" Monarch "EE" Tur. Lathe
3K Milwaukee Hor. Pl. Mill.
#2LMS—L-G 20" HSBB Drill
#2LMS—L-G 26" HSBB Drill
22"x48" ctrs. Monarch Lathe
#2 CIN. PLAIN HORIZ. H.S. DIAL TYPE MILL.
#2 & #3 Cinn. vert. H.S. dial type mills.
#2MH Cincinnati horiz. plain mills.
#2 Cincinnati centerless grinders
12"x30" centers Mod CK Monarch tool room lathe with double angular attachment.
#2H Milwaukee vertical miller.
All machines late type, guaranteed with AC mtr. drive
(New Bradford Grinders & Buffers in stock)
Licensed Dealer for War Assets Administration

JULIUS J. SCHNEIR & CO.
609 W. Washington Blvd.
CHICAGO 6, ILL. Dearborn 0268

STOCK TOOLS

PROMPT SHIPMENT

BOLT CUTTERS, No. 22 Marshey, Dble. Hd.
BOR. MILLS, 2½" bar, Cleveland, M.D.
BORING MILLS, 3" and 4½" bar Universal.
BORING MILL, No. 0 G & L, 3⅛" bar.
BORING MILL, Hor. 3½" Landis, Floor Type.
BORING MILL, 36" Bullard, "New Era".
BORING MILL, 42" King, Tur. & Side Hds.
BORING MILL, 60" N-B-P, 2 heads, M.D.
BORING MILL, 40" King, 2 heads, M.D.
BROACH, Hr. Hyd. XA Oilgear, 60" stroke.
BROACH, Vert. Hyd. 8RV5-42" LaPointe.
DRILL, Hvy. Duty, No. 518 Baker, No. 6 M.T.
GRINDER, Internal, No. 72A5 Heald, 2 Mtr.
GRINDER, Plain, 24"x240" Norton, M.D.
GRINDER, Surface, No. 5 Abrasive, 14"x48".
HAMMER, Board Drop, 1,000#, B & S.
HOISTS, Monorail, 3 ton, Detroit
LATHE, 22"x8' L & S. Sel. Grd. Hd.
LATHE, 24"x10' L & S. Sel. Grd. Hd.
LATHE, 36"x22' N-B-P, Grd. Hd., Q.C.G.
LATHE, 38"x19' Putnam, Grd. Hd., Q.C.G., T.A.
LATHE, 42"x32' American, Grd. Hd.
LATHE, 42"x50' Putnam, Grd. Hd.
MILLER, Duplex 24" Cincinnati, Auto.
MILLER, Plain, Nos. 3B, 4 & 5 Cincinnati.
PUNCH, Beam, L & A, Size "A", cap. 24" beams
PUNCH & SHR., No. 15 W & W, Dble. End.
SHAPER, Vert. 10" Pratt & Whitney.
SHAPER, 24" Steptoe, AC, M.D.
SHEAR, Bar, No. 3 United, Open End, M.D.
SHEAR, Plate, 132"x1½" Morgan, 28" thr.

PARTIAL LIST

LANG MACHINERY COMPANY
28th St. & A.V.R.R. Pittsburgh, Pa.

BUYS BY HASCO★

ALL FOR IMMEDIATE DELIVERY

UM6421AS—K & T #3 Std. Plain #3 Vert. Miller, Mtr. Drive.
UM6547—L & S 16" x 6' Geared Hd., Mtr. in Base, Late Type Lathe.
C5194—Bullard 36" High Column Vert. Tur. Lathe, All Mtr. Dr.
UM6481—Atlantic #2 Auto. Surf. Grdr., Mtr. Dr. Late Type.
C5180—American 3' 9" Radial Drill, Mtr. on Arm, Enclosed Head.
UM569—Cincinnati #4 Plain Horiz. Miller, SPD.
C5222—Cincinnati #2 Centerless Grinder, Motor Drive, FILMATIC Bearing.
UM6467—P & W 13" x 30" Lathe, Mtr. in base, Taper Att.

Write for New Hasco Circular #147AM

HASCO MACHINERY COMPANY
661-671 Frelinghuysen Ave.
Newark 5, N. J.
Bigelow 3-3486-7-8

BARGAIN
GORTON MILL

(1) 9J Gorton Mill with duplicating table.
Practically New—Less Than One Year of Actual Service
Immediate Shipment from Stock
Price.....$3850.00

WINSTON MACHINERY CO., Inc.
517 South Delaware Street
Indianapolis, Indiana

National Bent Shank Nut Tappers—Battery of 5/8" and 7/8" Machines.
2 Landis ¾" Bolt Formers and Threaders, M.D.
1 National ½" to 1" Hot Bolt Head Trimmer
Woodward & Powell 42" x 42" x 36 ft. 4 Head Planer
Cincinnati 36" x 36" x 16 ft. Planer, M.D.
1 Lodge & Shipley 36" Swing by 44 ft. Bed, Selective Geared Q.C. Lathe, M.D.

National Machinery Exchange
128-138 Mott St., New York 13, N. Y.

75 TON HORNING PRESS

No. GA 127 Pexto, 23½" throat, 12"x18" bed, bed integral with horn, back geared, motor drive, excellent condition.

FRANK J. LUNNEY
METAL WORKING MACHINERY
PHILADELPHIA 32, PA. BAldwin 9-5932

QUALITY TOOLS

AUTOMATICS

⅜" & 1¼" Cone 4 spindle
1¼" Cleveland 4 spindle
2"x18" Cleveland Model B
12"x63" & 14"x18" Fay
14"x18" Monarch Magna-Matic
No. 454 New Britain chucking
Gisholt simplimatic

BORING MILLS

3½" bar Universal horizontal
3½" bar Giddings & Lewis horiz.
4¾" bar Giddings & Lewis No. 300 Floor type
100" Niles Bement Pond heavy pattern
96" Cincinnati Massive Pattern
80" Colburn
53" Niles Bement Pond
24", 36" 42" Bullard V.T.L.

BROACHES

No. 2 S Lapointe
Twin 10 Oilgear duplex
VI Foote Burt duplex surface
3XA Oilgear
HP50 Lapointe
No. 3 Lapointe double screw
12 ton V50 American vertical
30 ton V48 American vertical

DRILLS

18" Walker Turner radial
24", No. 3 Leland Gifford 4 spdl., P.F.
21"x74" Munson double end
No. 00S Garvin double end
4-spdl. #3 Leland Gifford
21" & 24" Cincinnati upright
24", No. 25 Foote Burt Heavy Duty
34-spdl. #30 Natco

GEAR HOBBERS

Nos. 8H, 12H & 16HS Gould & Eberhardt
Nos. 3 & 12 Barber Colman
Mod. T Barber Colman taper spline
No. 130 Cleveland Rigidhobber
Nos. 1, 5A & 5AC Lees Bradner

LATHES, TURRET

Nos. 4 & 8 Warner & Swasey universal
Nos. 3-B & 5 Foster universal
Nos. 3 & 5 J. & L. universal
16"x8' South Bend
Nos. 2 & 5 Foster
24" & 42" Bullard vertical
28" Gisholt
3"x36" & 4"x34" Jones & Lamson

PRESSES

12 ton U.S. OBI
No. 4A Bliss horning
150 ton No. 661 Toledo coining
8 & 20 ton General Flexible
36 ton Metalwood straightening
1000 ton Lake Erie hydraulic

UPSETTERS

1" National
1½" & 2" Acme
3" National

MISCELLANEOUS

#10-D Moline cylinder borer
#112-C Ex-Cell-O precision borer
1220 Cu. Ft. Sullivan compressor
Nos. 2 & 3 Cincinnati centerless grinders
No. H-1 Micromatic Hydrohoner
#211 Barnes hener
No. 9 LeBlond multicut lathe
6", 8" and 15" Sundstrand automatic stub lathes
#12-B Pratt & Whitney profiler
Model J Radiac abrasive saw
#11-B Badger alligator shear
4" Stevens die slotter
16" Bement Miles slotter
#2 Garvin tapper
90 KVA Fisher body seam welder

SEND FOR COMPLETE LIST

MILES MACHINERY CO.
SAGINAW, MICH.

CLOSEOUTS

BORING MILLS

#OG&L Spd.
2⅛" Cleveland Spd.
2½", 4" Binsee
66" Niles
54" Colburn, M.D., 2 hds.

TURRET LATHES

Foster Nos. 4, 5, 6, 1B, 3B M.D. Univ.
J. & L. 2¼"x24", 3¼"x36".
Acme #2 M.D.
No. 1L, 2L Gisholt Univ. M.D.

GRINDERS

P. & W. 18", B.B., Vert. M.D.
Blanchard 30", M.D.; Modern 12x48" M.D.
Norton Hydraulic 12x18", M.D.
Heald Nos. 72A3 Gagematic
Norton 50"x28', M.D.
Landis Type A 6x20" Hydraulic, M.D.
Bryant No. 12, M.D.
No. 55, 60, 65 Heald int. Hydraulic, M.D.
12" Heald Rotary Arter 12" M.D.
B. & S. No. 2, 2B Surface, M.D.
B. & S. No. 10 1 Cyl.
No. 2 Cincinnati Centerless M.D.
B. & S. No. 1, 3 Universal
#25, #55 G. & L. M.D.
#25A Heald, M.D.

LATHES

Monarch geared head
McCabe 26-42"x14'
26x12' Boye & Emmes 3 step cone B.D.G.
14"x6', 16"x6' Hendey
9" LeBlond Automatic
36x30' Putnam M.D.
36x22" Putnam, D.C. M.D.
32"x35' Wickes
Putnam 42x16', M.D. S.C.G.
P. & W. 1x18, Automatic Lathes

AUTOMATICS

Cleveland Model A ½", ⅞", 1¼", 2"
Cleveland Model B 1", 2"
P & J 6A, M.D.
⅞" Cone 4 spindle

New in Stock—Power Shears 52" and 72"

Spot & Arc Welders
5, 10, 18 & 30 ton OBI Power Presses
7" Ammco Shapers
H.S. Vertical Milling Heads, Drill Presses, Foot Presses
Kalamazoo Metal Band Saws
8" Shap-Rite Shapers
No. 1½ Abrasive Surface Grinder
6x6" Racine Hacksaw
20 & 30 ton Northern Hydraulic Presses

RADIALS

4', 5', 6' American Triple Purpose
4', 5' Cincinnati-Bickford
4' Muller, M.D.; 4' 5' Western, S.P.D.
4' Fosdick

MILLING MACHINES

No. 3S Cincinnati, S.P.D. rapid trav. M.D.
Nos. 1Y, 0Y, 3, 4, 5 B & S Plain & Univ.
B. & S. Nos. 12, 13, 13B
Hall Planetary Model D Thread Miller
Becker Nos. 3, AB, 5, 6, Vert.
Nos. 3, 4, Cincinnati Vert.
P. & W. No. 2, 30 Profiler M.D.
K. & T. B. & S., No. 2, 3 like new
B. & S. No. 1, 3, Vert.
No. 8D, Gorton Vertical, M.D.
#3 Van Norman Universal
#2 Conradson Universal
#22L Van Norman Univ.

MISCELLANEOUS

Gorton No. 1S Engraving Machine
6 spindle Avey Drill 15" overhang
Rochester No. 5½" B Hammer
6" Vertical Shaper P & W
Oster Pipe Machines, 4", 6", M.D.
N.B.P. 15" Slotter M.D.
10x10 Peerless Universal Shaping Saw
#7 72 Fellows Gear Shapers
Lennox Throatless shear ¼" cap., M.D.

AARON MACHINERY CO., INC.

MONA WELDER

45 Crosby St.
New York 12, N. Y.

AT TREMENDOUS SAVINGS

SMALLEY GENERAL THREAD MILLERS, 24" swing 36" centers, (15)
FOOTE-BURT VERT. 9 sp. Hyd. Drills, #4 & #5 MT, Rotary Table (5)—Crank Balancing Machine
LAPPING MACHINES, #20 Ultra Lap (4)
#412 New Britain Gridley 4 Sp. Automatic Chuckers (3)
Model R14, Seneca Falls Automatic Le-Swing Lathes (8)
Model LR 5"x22" Seneca Falls Automatic Le-Swing Lathes
Milwaukee Model M-24 Simplex Mfg. Milling Machine
Cincinnati Model 0-8 Vertical Milling Machine
Lees Bradner Model 40 Thread Millers
32"x14' Engine Lathe
36"x14' Ingersoll Slab Miller

CONTINENTAL SALVAGE & MACHINERY CORP.
1836 Euclid Ave. Cleveland 15, Ohio

LATEST TYPE TURRET LATHES

#4 Warner & Swasey Universal, Preselector Heads, Tooling AC Motor Drive.

#1A Warner & Swasey, Preselector Head, AC Motor Drive.

Immediate Delivery from Stock

O'CONNELL MACHINERY CO.
1825 Niagara Buffalo 7, N. Y.
Delaware 3400

NEED MACHINERY FOR LIGHT METALS MANUFACTURING?

FARNHAM countersinkers, carriage drills, spar millers, forming rolls are known wherever light or heavy metals are fabricated.

Used machines are available at surplus centers. We can rebuild and guarantee them as new.

FARNHAM
MANUFACTURING COMPANY
1646 SENECA ST., BUFFALO 10, N. Y.

FOR SALE

Three #35 Excello Thread Grinders with all attachments and accessories; in excellent condition; three years old; operation hours less than 1,800.

Price for Immediate Sale $6,500.00 Each.

West Coast Machine & Tool Co.
1016 North McCadden Place
Los Angeles 38, California
Telephone—HEmpstead 3241

DROP HAMMER, Billings and Spencer, 800 lbs., 1.20 carbon steel strip .006 in. by 2 in. 510 lbs. annealed, F.O.B. Union, N. J.

AKME-STEELE
MEDICAL ARTS BLDG., HAMILTON, CANADA

For Every Business Want
Think "Searchlight" First!

"Searchlight" is the classified advertising of Employment, Equipment and Business Opportunities in American Machinist. It reflects current opportunities, both offered and wanted. Use it for your business wants.

IN STOCK

LATHES

12"x18" Lipe Carbo, M.D.
18"x6' American Grd. Hd.
18"x48" Monarch, Keller attachment (1942)
22"x48" Monarch, (1943)
36"x30' Lodge & Shipley Triple Geared Selective Head, two carriages
42"x18' Putnam Geared Head
42"x30' American Grd. Hd.

MILLING MACHINES

No. 2H Milwaukee Vertical (1942)
No. 2 Cincinnati Med. Spd. Vertical (1942)
No. 3 Cincinnati Vertical
No. 3 Milwaukee Vertical M.D.
No. 3K Milwaukee Vertical
No. 4 Cincinnati Med. Spd. Plain (1941)
No. 4 Cincinnati Plain, Motor Drive
No. 118 Van Norman Production
24" Cincinnati Production
Taylor & Fenn Spline
No. 27MB Smalley General Thread
No. 2 Hanson-Whitney Thread
No. 6 Lees-Bradner Thread
24"x24"x12' Ingersoll Adjustable Rail
26"x25"x12' Ingersoll Adjustable Rail

DRILLS

D-8 Colburn Hvy. Duty
No. 2-8 Spdl. Leland-Gifford
3' Morris Mor-Speed Radial, 9" Col.
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INDEX OF PRODUCTS ADVERTISED IN THIS ISSUE

Abrasives.....30-31, 58-59, 276, 296, 340

Accessories and Attachments (Machine Tool) 50, 51, 93, 225, 228, 238, 242, 258, 260, 273, 285, 296, 302, 306, 307, 308, 311, 329, 330, 336, 338, 340, 344, 346, 364

Bending Machines.....258, 341

Boring, Drilling Machines (Horizontal) 44, 261

Boring & Turning Machines (Vertical) 65, 67, 288

Broaching Machines.....40, 164, 267

Brushes 206

Cleaners, Hand..... 320

Cleaning & Drying Machines and Supplies 63, 238, 316

Cut-Off Machines, Sawing Machines...54, 274, 291, 293, 298, 334

Dressers, Grinding Wheel.....332, 338

Drilling and Tapping Machines....20-21, 71, 95, 250, 260, 264, 294, 296, 297, 298, 332, 342, 346

Engineering and Production Services.. 86

Gages and Instruments.....55, 83, 161, 162, 173, 298, 314, 315, 320, 335, 338, 339, 344, 370

Gear Cutters; Hobbing Machines.... 3, 6-7, 79, 336

Gears, Speed Reducers, Motor Reducers.....74, 210-211, 243, 244, 245, 246, 247, 248, 249, 260

Grinders, Lappers, Hones, Polishers, Buffers, Finishing Machines..... 2nd cover, 8-9, 15, 16, 17, 22-23, 56, 80, 84, 87, 263, 269, 283, 284, 288, 290, 305, 306, 339, 342

Heat Treating Equipment and Supplies 321, 322, 346

Insurance 28, 29

Jig Borers 36, 266, 279

Lathes, Engine.....20, 75, 76, 88, 89, 92, 179, 270, 277, 278, 302, 303, 340

Lathes, Turret.....53, 72-73, 82, 171

Lubricants, Cutting Fluids, Quenching Oils, Rust Preventatives....16, 49, 98, 212, 217-218, 272, 281, 316, 319, 328, 329, 331

Marking Machines and Tools....344, 346

Materials, Cutting and Forming..... 66, 183, 205, 216, 342

Materials of Manufacture.....26, 27, 57, 166, 181, 187, 191, 198, 199, 219, 220, 222, 236

Materials Handling Equipment.....190, 204, 226-227, 234-235, 340, 348

Millers, Die Sinkers, Profilers.....4-5, 10-11, 34-35, 39, 43, 45, 51, 262, 289, 295, 304

Parts and Equipment, Electrical..94, 209

Parts and Equipment, Hydraulic and Pneumatic 225, 228, 232, 240

Parts and Equipment, Mechanical.... 24, 61, 64, 177, 192, 194, 195, 197, 201, 203, 207, 213, 214, 215, 221, 223, 224, 229, 230, 231, 232, 233, 236, 237, 238, 239, 240, 241, 242, 292, 323, 327, 332, 337, 4th cover

Photographic Service.....302

Planers 32, 52

Plastic and Rubber Molding Machines. 33

Presses, Forging and Forming Equipment and Supplies.....38, 41, 46, 81, 96, 175, 185, 192, 251, 252, 253, 254, 255, 256, 257, 258, 259, 271, 290, 292, 346

Riveting Machines.....254

Safety Equipment.....60, 200

Screw Machines; Chucking Machines.....37, 69, 91, 168, 306, 3rd cover

Shapers, Slotters, Keyseaters.....100, 262, 280, 302

Soldering Flux.....348

Special Machine Tools.....48, 71, 339

Steel Blue.....344

Swaging Machines.....254

Threading Machines....12-13, 78, 208, 296

Tools, Cutting.....18-19, 25, 47, 68, 70, 77, 85, 86, 90, 162, 183, 188, 202, 262, 265, 268, 275, 282, 286, 287, 299, 300, 301, 302, 304, 312, 313, 328, 330, 342, 344, 346, 366, 368

Tools, Hand.....42, 193, 196, 328

Tools, Portable.....189, 290, 292, 310

Transportation 186, 242

Welding and Cutting, Brazing and Soldering Equipment and Supplies.. 62, 198, 213, 309

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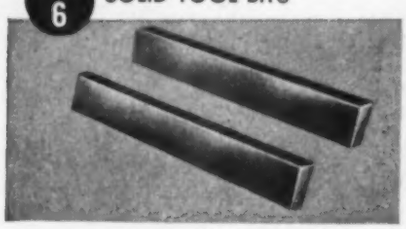

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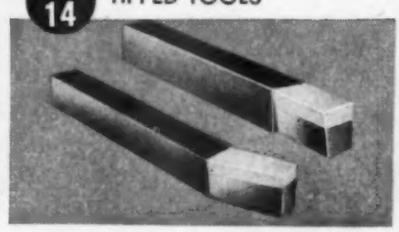

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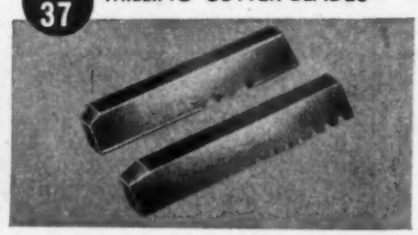

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ADVERTISERS INDEX

	Page
Abbott Ball Co.	232
Abrasive Machine Tool Co.	296
Accreylon Co. Inc.	242
Acromark Company	346
Adams Co.	74
Air Hydraulics Inc.	254
Air Reduction	321
Allegheny Ludlum Steel Corp.	205
Allen Manufacturing Co.	232
Allied Products Corp.	252
Allis-Chalmers Mfg. Co.	61
Almond Mfg. Co., T. R.	338
Aluminum Co. of America	57
American Broach & Machine Co.	40
American Chain & Cable Co., Inc.	293
American Optical Co.	60
American Rolling Mill Co.	166
American Screw Co.	207
American Swiss File & Tool Co.	196
American Tool Works Co.	20, 21
American Wheelabrator & Eqpt. Co.	63
Anton Machine Works	258
Armstrong-Blum Mfg. Co.	54
Armstrong Bros. Tool Co.	50
Arter Grinding Machine Co.	339
Atkins & Co., E. C.	287
Atlas Metal Stamping Co.	38
Atlas Press Co.	295
Avey Drilling Machine Co.	260
Baker Bros. Inc.	264
Baldwin Southwark Div., Baldwin Locomotive Works	271
Ball & Roller Bearing Co.	242
Barber-Colman Co.	79
Bardons & Oliver Inc.	82
Barnes Co. Inc., W. O.	304
Barnes Drill Co.	93
Baumbach Mfg. Co., E. A.	258
Baush Machine Tool Co.	250
Bay State Abrasive Pdts. Co.	276
Bethlehem Steel Co.	216
Bijur Lubricating Corp.	223
Black & Decker Mfg. Co.	189
Blake Co., Edward	342
Blanchard Machine Co.	56
Blank & Buxton Machinery Co.	304
Bliss Co., E. W.	81
Boston Gear Works, Inc.	244, 245
Bradford Machine Tool Co.	302
Braun Gear Co.	246
Brewer Machine Co., Wm. F.	346
British Industries Fair	347
Brown & Sharpe Mfg. Co.	69
Bryant Chucking Grinder Co.	87
Buckeye Brass & Mfg. Co.	323
Bullard Co.	273
Bunting Brass & Bronze Co.	337
Campbell Division, Andrew C. Amer. Chain & Cable Co., Inc.	293
Carboloy Co., Inc.	183
Carborundum Co.	58, 59
Card Mfg. Co., S. W.	312
Carlton Machine Tool Co.	298
Carnegie-Illinois Steel Corp.	26, 27
Central Screw Co.	207
Chisholm-Moore Hoist Corp.	339
Cimcool Division, Cincinnati Milling Machine Co.	49
Cincinnati Bickford Tool Co.	95
Cincinnati Gear Co.	246
Cincinnati Gilbert Mach. Tool Co.	260
Cincinnati Grinders Incorporated	8, 9
Cincinnati Milling Machine Co.	4, 5
Cincinnati Planer Co.	32
Cincinnati Shaper Co.	100
Circular Tool Co.	330
Cities Service Oil Co.	212
Clark Equipment Co. (Drill Division)	190
Clearing Machine Corp.	251
Cleveland Automatic Mach. Co.	3rd Cover
Cleveland Crane & Engineering Co.	175
Cleveland Tapping Machine Co.	294
Cleveland Twist Drill Co.	66
Columbia Steel Co.	26, 27
Columbus Die Tool & Machine Co.	324
Columbus-McKinnon Chain Corp.	339
Cone Automatic Machine Co.	37
Consolidated Machine Tool Corp.	67
Continental Screw Co.	207
Continental Tool Works Div. Ex-Cell-O Corp.	85
Corbin Screw Div. American Hardware Co.	207
Cosa Corporation	279
Coulter Machine Co., James	302
Covel Manufacturing Co.	17
Crafts Co., Inc., Arthur A.	344
Cross Co.	48
Cullen-Friestedt Co.	198
Curtis Pneumatic Machinery Co.	348
Cushman Chuck Co.	364
Danly Mach. Specialties Inc.	96
Darnell Corporation	192
Davis & Thompson Co.	260
Davis Keyseater Co.	262
Dayton Rogers Mfg. Co.	252
Dayton Rubber Mfg. Co.	197
Defiance Machine Works, Inc.	261
Delta Mfg. Co.	334
Denison Engineering Co.	255
Desmond-Stephan Mfg. Co.	338
Detroit Bevel Gear Co.	249
Detroit Broach Co.	299
Detroit Reamer & Tool Co.	70
Detroit Tap & Tool Co.	173
DeVlieg Machine Co.	36
Dodge Mfg. Corp.	239
DuMont Corp.	25
Dumore Co.	283, 284
Dykem Co.	344
Earle Gear & Machine Co.	249
Eastern Machine Screw Corp.	328
Elastic Stop Nut Corp. of America	195
Electric Storage Battery Co.	226, 227
Electro Mechano Co.	346
Elmes Engineering Works	253
Employers Mutual Liability Ins. Co. of Wisconsin	28, 29
Errington Mechanical Laboratory	296
Etna Machine Co.	274
Ettco Tool Co.	311
Ex-Cell-O Corporation	85
Fab-Weld Corporation	236
Fafnir Bearing Co.	203
Falk Corp.	210, 211
Famco Machine Co.	254
Federal Press Co.	46
Fellows Gear Shaper Co.	6, 7
Firth-Sterling Steel & Carbide Corp.	268
Fitchburg Grinding Machine Corp.	269
Fitzsimons Co.	222
Foote Bros. Gear & Mach. Corp.	247
Foote-Burt Co.	164
Formica Insulation Co.	191
Formsprag Co.	332
Frost Paint & Oil Corp.	198
Gairing Tool Co.	275
Gallmeyer & Livingston Co.	306
Ganschow Gear Co.	249
Gardner Machine Co.	305
Gates Rubber Co.	237
General Die & Stamping Co.	329
General Electric Co., Plastics Div.	248
General Engineering & Mfg. Co.	280
Giddings & Lewis Mach. Tool Co.	44
Gilmore & Co., F. F.	312
Gisholt Machine Co.	53, 75
Gleason Works	3
Gorham Tool Co.	368
Gorton Machine Co., George	289
Goss & de Leeuw Machine Co.	306
Graham Mfg. Co.	346
Grant Gear Works	248
Grant Mfg. & Machine Co.	254
Gray Co., G. A.	52
Grobet File Co.	342
Hamilton Tool Co.	340, 342
Hansen Manufacturing Co.	233
Hanson Whitney Machine Co.	208
Hardinge Brothers, Inc.	43
Harper Co., H. M.	207, 292
Hartford Special Machy. Co.	249, 340
Haskins Co., R. G.	292
Haynes Stellite Company	366
Heald Machine Co.	2nd Cover
Hendey Machine Co.	270
Henry & Wright Mfg. Co.	252
Hill Acme Co.	84
Hones, Inc., Charles A.	346
Howell Electric Motors Co.	209
Hydraulic Press Mfg. Co.	33
Independent Pneumatic Tool Co.	310
Ingersoll Milling Machine Co.	34, 35
International Nickel Co., Inc.	187
International Screw Co.	207
J-O Manufacturing Co.	328
J & S Tool Co.	332
Johnson Bronze Co.	214
Jones & Lamson Machine Co.	88
Jones & Laughlin Steel Corp.	181
Kearney & Trecker Corp.	39
Kempsmith Machine Co.	51
Kester Solder Co.	348
King Machine Tool Co.	65
Koebel Diamond Tool Co.	342
Kux Machine Co.	230
L & S Bearing Co.	242
L. W. Chuck Co.	308
Lake Erie Engrg. Corp.	256, 257
Laminated Shim Co., Inc.	194
Lamson & Sessions Co.	207
Landis Machine Co.	12, 13
Landis Tool Co.	14, 15
LaPointe Machine Tool Co.	267
Leach Machy. Co., Inc., H.	330
Lee Co., K. O.	285
Leland-Gifford Co.	296
Lempco Products Inc.	77
Lincoln Electric Co.	62

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ADVERTISERS INDEX

	Page
Lincoln Park Industries, Inc.	314
Linley Brothers Co.	262
Lodge & Shipley Mach. Tool Co.	171
Logan Engineering Co.	277
Luers, J. Milton	302
M & N Machine Co.	290
Mahon Co., R. C.	213
Mead Specialties Co.	240
Meisel Press Mfg. Co.	248
Metal Carbides Corp.	282
Metro Tool & Gage Co.	313
Micromatic Hone Corp.	263
Midvale Co.	219
Milford Rivet & Machine Co.	207
Miller-Knuth Mfg. Co.	298
Mitts & Merrill	302
Moline Tool Co.	288
Molybdenum Corp.	220
Monarch Machine Tool Co.	179
Monarch Steel Co.	222
Moore Special Tool Co.	266
Morse Chain Co.	221
Morse Twist Drill & Machine Co.	18, 19
Motch & Merryweather Co.	291
Natl. Automatic Tool Co., Inc.	71
Natl. Bearing Div., American Brake Shoe Co.	215
National Lock Co.	207
National Lock Washer Co.	236
National Machine Tool Co.	330
National Machinery Co.	259
National Screw & Mfg. Co.	207
Natl. Twist Drill & Tool Co.	301
Nelco Tool Co., Inc.	265
Newark Gear Cutting Machine Co.	248
New Britain-Gridley Mach. Div., New Britain Machine Co.	168
New Departure Div., Gen. Motors Corp.	177
New England Screw Co.	207
The N. Y., N. H. & Hartford RR Co., The New England Transp. Co.	186
Nicholson & Co., W. H.	340
Nicholson File Co.	193
Noble & Westbrook Mfg. Co.	344
Norma-Hoffmann Bearings Corp.	231
Norton Company	22, 23, 55
O.K. Tool Co.	346
Oakite Products, Inc.	316
Oliver Instrument Co.	288
O'Neil-Irwin Mfg. Co.	258
Orange Roller Bearing Co., Inc.	201
Osborn Mfg. Co.	206
Park Chemical Co.	322
Parker-Kalon Corp.	207, 241
Parker Rust Proof Company	281
Pawtucket Screw Co.	207
Peninsular Grinding Wheel Co.	30, 31
Pheoll Mfg. Co.	207
Philadelphia Gear Works, Inc.	243
Phillips Screw Mfrs.	207
Photographers' Assn. of America	302
Pines Engineering Co., Inc.	341
Pioneer Pump & Mfg. Co.	238
Pope Machinery Co.	307
Potter & Johnston Machine Co.	91
Pratt & Whitney Div., Niles-Bement-Pond Co.	45
Procunier Safety Chuck Co.	329
Production Machine Co.	288
Producto Machine Co.	258
Rwy. Express Agency Air Exp. Div.	242
Randall Co., Frank E.	298
Reading Screw Co.	207
Reed-Prentice Corp.	340
Reed Rolled Thread Die Co.	296
Refiners Lubricating Co.	200
Republic Steel Corp.	234, 235
Reynolds Metals Co., Inc., Alum. Div.	199
Rivett Lathe & Grinder, Inc.	80
Rollway Bearing Co.	327
Russell Burdsall & Ward Bolt & Nut Co.	207
S.K.F. Industries, Inc.	64
Safety & Maintenance Co.	200
Sales Service Mach. Tool Co.	192
Scherr Co., Inc., George	370
Schrader's Sons, A.	225
Scovill Manufacturing Co.	207
Seneca Falls Machine Co.	303
Shakeproof, Inc.	207
Sheffield Corp.	161
Sheldon Machine Co., Inc.	278
Shore Instrument & Mfg. Co., Inc.	338
Sibley Machine & Foundry Corp.	298
Sidney Machine Tool Co.	89
Sier-Bath Gear & Pump Co. Inc.	246
Sigourney Tool Co.	332
Simonds Saw & Steel Co.	47
Sinclair Refining Co.	16
Smith Corporation, A. O.	309
Snow Manufacturing Co.	297
Socony-Vacuum Oil Co. Inc.	319
South Bend Lathe Works	92
Southington Hardware Mfg. Co.	207
Springfield Machine Tool Co.	76
Square D Co.	94
Stahl Gear & Machine Co.	248
Standard of California	331
Standard Gage Co., Inc.	315
Standard Machinery Co.	292
Standard Oil Co. (Indiana)	217, 218
Standard Pressed Steel Co.	24, 240
Staples Tool Co.	90
Starrett Co., L. S.	162
Steel Company of Canada, Ltd.	207
Steelweld Machy. Div. Cleveland Crane & Engineering Co.	175
Sterling Bolt Co.	207
Strand Co., N. A.	290
Strong, Carlisle & Hammond Co.	240
Stronghold Screw Products Inc.	207
Stuart Oil Co., Ltd., D. A.	329
Sturgis Products Co.	290
Taylor Machine Co.	260
Tennessee Coal, Iron & Railroad Co.	26, 27
Texas Co.	98
Thomas Hoist Co.	306
Thompson Grinder Co.	78
Thompson & Son Co., Henry G.	202
Tidewater Associated Oil Co.	272
Timken Roller Bearing Co.	4th Cover
Tomkins-Johnson Co.	228
Torrington Co.	224, 254
Tubular Micrometer Co.	320
Tuthill Pump Co.	238
Union Carbide & Carbon Corp.	366
Union Twist Drill Co.	68
U. S. Drill Head Co.	338
U. S. Steel Corp.	26, 27
U. S. Steel Export Co.	26, 27
V. & C. Press Co.	258
Valvair Corp.	232
Van Keuren Co.	83
Van Norman Co.	10, 11
Veraloy Products Ltd.	238
Victor Saw Works	262
Vitrified Wheel Co.	340
Vulcan Tool Corp.	86
Waldes Koh-I-Noor, Inc.	229
Walker Co., Inc., O. S.	336
Waltham Machine Works	336
War Assets Administration	326, 333, 343, 345
Warner & Swasey Co.	72, 73
Waverly Petroleum Products Co.	200
Wells Mfg. Corp.	286
Wendt-Sonis Co.	188
West Disinfecting Co.	320
Wheelock, Lovejoy & Co., Inc.	236
Whistler & Sons Inc., S. B.	185
White & Bagley Co.	328
Williams & Co., J. H.	42
Wilson Mechanical Instrument Co.	339
Wilson, K. R.	41
Winter Brothers Co.	300
Wolverine Bolt Co.	207
Woodworth Co., N. A.	260, 335

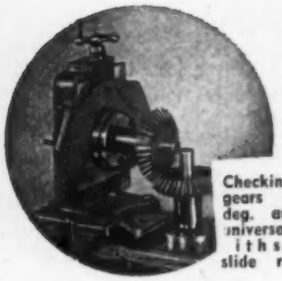
SEARCHLIGHT SECTION

Classified Advertising

Classification	Page
CONTRACT WORK	349
Bowers Machine Co., Ltd.	349
Brinser & Sons, J. W.	349
Elram Pattern Works	349
G & W Plating Co.	349
General Pattern Works	349
Held, O. P.	349
Jarvi Mfg. Co., Inc., C. W.	349
La Salle Engineering Co.	349
Mars Mfg. & Machine Co.	349
Possy's Tool & Mfg. Co.	349
Toledo Iron & Steel Co., The	349
Waltham Screw Co.	349
EMPLOYMENT SERVICE	349
PATENT ATTORNEY	350
POSITIONS VACANT	349
POSITIONS WANTED	350
PROFESSIONAL SERVICES	350
REBUILDING SERVICES	359, 360, 363
Botwinik Bros. of Mass.	363
Botwinik Bros., Inc.	360
Hill-Clarke Machy. Co.	363
Simmons Machine Tool Corp.	359
SELLING OPPORTUNITIES	350
SPECIAL SERVICES	350
USED EQUIPMENT	350-363
Aaron Machy. Co., Inc.	354, 362, 363
Akme Steel Dental Mfg. Co.	362
Botwinik Bros., Inc.	360
Botwinik Bros. of Mass.	363
Brooks Inc., B. D.	358
Brownell Hazard	354
Continental Salvage & Mchy. Corp.	362
DeWitt Tool Co.	356
Dony Machinery Co., D. E.	358
Eastern Machinery Co.	355
Emerman Machinery Corp.	357
Falk Machinery Co.	351
Farnham Mfg. Co.	362
Ganey Machinery Co.	359
General Machy. & Eq. Co.	361
Gotham Mchy. Corp.	358
Hasco Machinery Co.	361
Hill-Clarke Machinery Co.	363
Hyman & Son, Joseph	360
Indianapolis Machy. & Supply Co.	354
Kings County Mchy. Exchange	358
Lang Machinery Co.	361
Lunney, Frank J.	361
McDonald Machinery Co.	356
Miles Machinery Co.	362
Morey Machinery Co., Inc.	352, 353
National Machy. Exchange	361
O'Connell Mchy. Co.	362, 363
Osborne & Sexton Machinery Co.	356
Ott Machinery Sales Inc.	360
Paul's Motor & Machy. Supply	360
Press & Shear Exchange Inc.	362
Reynolds Machinery Co.	360
Rix Co., John W.	350
Schneir & Co., Julius J.	361
Simmons Machine Tool Corp.	359
Smith Machine Tool Co.	350
Southern Plastics Co., Inc.	350
United Machinery & Tool Corp.	358
Victor Machinery Exchange, Inc.	356
West Coast Machine Tool Co.	362
West Penn. Machinery Co.	360
Wigglesworth Machy. Co.	356
Winston Machinery Co., Inc.	361
Zeeve & Co., Alex.	354

Tells all you want to know about a gear

Checking pinion and gear between centers in universal head.



Checking bevel gears of 90 deg. angle in universal head, with swivel slide removed.

Testing spiral gear with a master spur gear, bracket of universal head tilted to 45 deg.

Testing worm held between horizontal centers of universal head.

Instantly spots and records errors in center distance, eccentricity, tooth thickness, rolling action, etc.

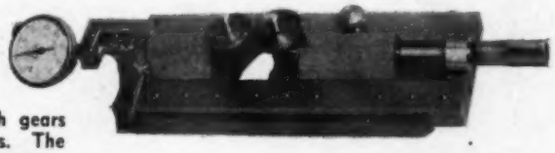
Handles internal and external gears, spurs, spirals, bevels, worms.

PARKSON GEAR TESTER

Sensitive floating carriage riding on balls shows every characteristic in the meshing of the gear under test through its entire rotation. A dial indicator tells the story in thousandths. The Parkson Gear Tester is made in ten sizes for gears from ¼" to 36" center distance.

A recording attachment can be applied, providing a permanent record of every gear tested. A 4" waxed paper disc is used without ink or other liquids. This record proves the gear's accuracy in the event of malfunction caused by incorrect center distance in the housing, or other cause.

Full details on request.

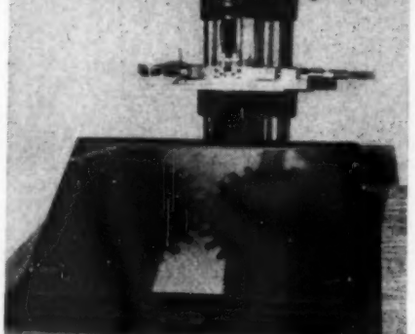


G-S GEAR TESTER

Indispensable for checking fine pitch gears and instantly disclosing gear errors. The slide on the right is adjusted by micrometer and locked in position. The slide on the left floats under spring pressure against the indicator. Tests are rapidly made and require no special skill.

WILDER PROJECTOR

Shows a magnified picture of the part under inspection bringing out details on surfaces as well as contour. A typical application is in connection with the G-S Gear Tester, as illustrated. The gear tester is placed on the standard work table, and rotating of the gears gives a highly magnified picture of how each tooth performs in meshing. The Wilder Projector is also widely used in checking contours of cams and other shapes against a master drawing enlarged to scale.



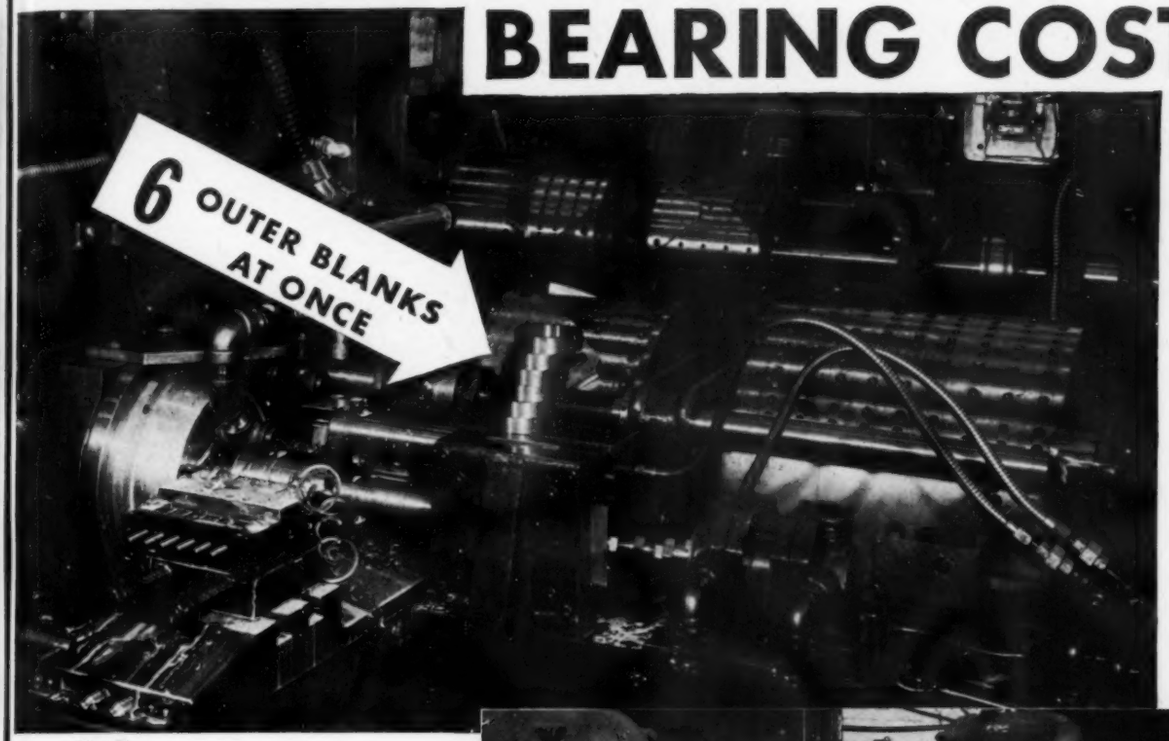
NEW—COMPLETE—

SCHERR
SMALL TOOL CATALOG

96 pages of valuable data on the wide range of precision tools in the Scherr line. *Now ready for your request.*

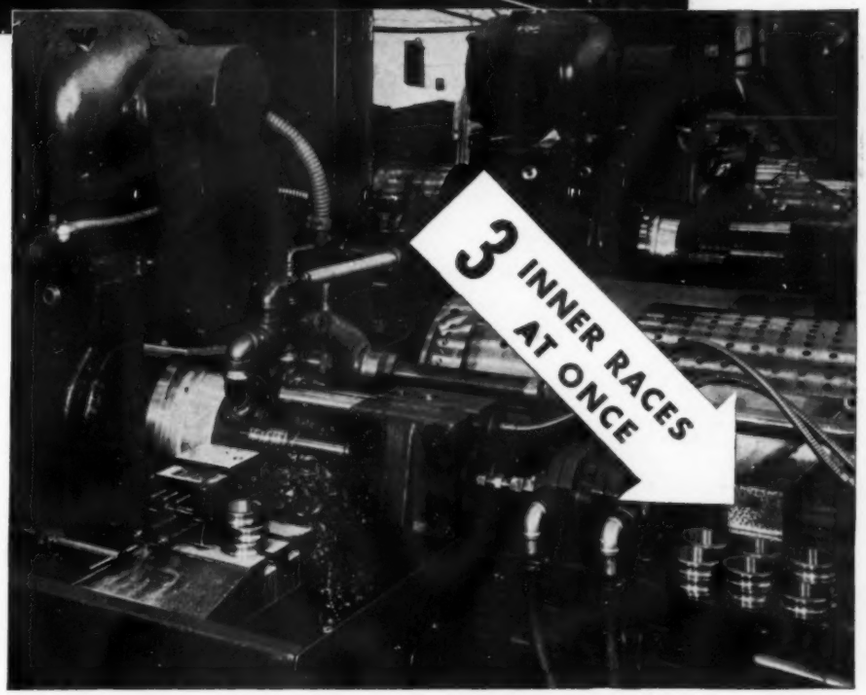
GEO. SCHERR CO., Inc. 201 LAFAYETTE STREET NEW YORK 12, N. Y.

"BEARING DOWN" ON BEARING COSTS!



with

CLEVELAND Automatics



The road to economy in these two set-ups for production of high quality bearing components on Cleveland Model B 3¼" automatics is through multiple deliveries per cycle. The outer race blanks, 3.558" in diameter, are produced six at a time from SAE 52100 cold drawn tubing. Inner races (2.985" OD) are formed complete with radii and chamfered ends, and delivered three at a time in a fast cycle, also using tube stock. Just an example of the fact that low cost production with Clevelands is not limited to fancy tooling jobs.

Get a CLEVELAND production proposal on YOUR next job.

THE CLEVELAND AUTOMATIC MACHINE COMPANY

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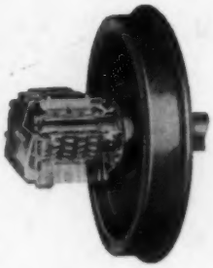
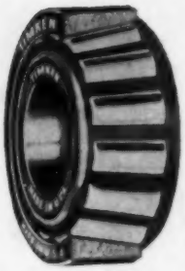
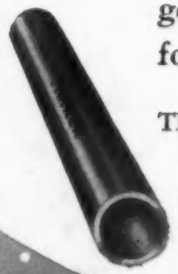
TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.







Means "Made By The Timken Roller Bearing Company." It identifies the source of Timken Tapered Roller Bearings, Timken Railroad Roller Bearings, Timken Alloy Steel, Timken Seamless Steel Tubing and Timken Rock Bits. This trade-mark is your assurance of getting genuine Timken products. Look for it when buying.

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